The EPA Administrator signed the following proposed rule on September 14, 2001. It is being submitted for publication in the *Federal Register*. While EPA has taken steps to ensure the accuracy of this Internet version of the rule, it is not the official version of the rule for purposes of public comment. Please refer to the official version in a forthcoming *Federal Register* publication and on GPO's Web Site. The rule will likely be published in the *Federal Register* in the first week of October 2001. You can access the *Federal Register* at: http://www.access.gpo.gov/su_docs/aces/aces140.html. When using this site, note that "text" files may be incomplete because they don't include graphics. Instead, select "Adobe Portable Document File" (PDF) files.

For the reasons set out in the preamble, title 40, chapter I of the Code of Federal Regulations is proposed to be amended as set forth below.

PART 89—CONTROL OF EMISSIONS FROM NEW AND IN-USE NONROAD COMPRESSION-IGNITION ENGINES

1. The authority for part 89 continues to read as follows:
Authority: 42 U.S.C. 7521, 7522, 7523, 7524, 7525, 7541, 7542, 7543, 7545, 7547, 7549, 7550, and 7601(a).

Subpart A—[Amended]

2. Section 89.2 is amended by adding definitions for aircraft and spark-ignition in alphabetic order and revising the definition of compression-ignition to read as follows:

§89.2 Definitions.

* * * * *

Aircraft means any vehicle capable of sustained air travel above treetop heights.

* * * * *

Compression-ignition means relating to a type of reciprocating, internal-combustion engine that is not a spark-ignition engine.

* * * * *

Spark-ignition means relating to a 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.

* * * * *

PART 90—CONTROL OF EMISSIONS FROM NONROAD SPARK-IGNITION ENGINES AT OR BELOW 19 KILOWATTS

3. The title to part 90 is proposed to be amended as set forth above.

4. The authority for part 90 continues to read as follows:

Authority: 42 U.S.C. 7521, 7522, 7523, 7524, 7525, 7541, 7542, 7543, 7547, 7549, 7550, and 7601(a).

Subpart A—[Amended]

5. Section 90.1 is revised to read as follows:

§90.1 Applicability.

(a) This part applies to new nonroad spark-ignition engines and vehicles with gross power output at or below 19 kilowatts (kW) used for any purpose, unless we exclude them under paragraph (c) of this section.

(b) This part also applies to engines with a gross power output above 19 kW if the manufacturer uses the provisions of 40 CFR 1048.615 or 40 CFR 1048.145 to exempt them from the requirements of part 1048 of this chapter. Compliance with the provisions of this part is a required condition of that exemption.

(c) The following nonroad engines and vehicles are not subject to the provisions of this part:

(1) Engines used in snowmobiles, all-terrain vehicles, or off-highway motorcycles and regulated in 40 CFR part 1051. This part nevertheless applies to engines used in all-terrain vehicles or off-highway motorcycles if the manufacturer uses the provisions of 40 CFR 1051.615 to exempt them from the requirements of part 1051 of this chapter. Compliance with the provisions of this part is a required condition of that exemption.

(2) Engines used in highway motorcycles. See 40 CFR part 86, subpart E.

(3) Propulsion marine engines. See 40 CFR parts 91 and 1045. This part applies with respect to <u>auxiliary marine engines</u>.

(4) Engines used in aircraft. See 40 CFR part 87.

(5) Engines certified to meet the requirements of part 1048 of this chapter.

(6) Hobby engines.

(7) Engines that are used exclusively in emergency and rescue equipment where no certified engines are available to power the equipment safely and practically, but not including generators, alternators, compressors or pumps used to provide remote power to a rescue tool. The equipment manufacturer bears the responsibility to ascertain on an annual basis and maintain documentation available to the Administrator that no appropriate certified engine is available from any source.

(d) Engines subject to the provisions of this subpart are also subject to the provisions found in subparts B through N of this part, except that subparts C, H, M and N apply only to Phase 2 engines as defined in this subpart.

(e) Certain text in this part is identified as pertaining to Phase 1 or Phase 2 engines. Such text pertains only to engines of the specified Phase. If no indication of Phase is given, the text pertains to all engines, regardless of Phase.

6. Section 90.2 is amended by adding a new paragraph (c) to read as follows:

§90.2 Effective dates.

* * * * *

(c) Notwithstanding paragraphs (a) and (b) of this section, engines used in recreational vehicles with engine rated speed greater than or equal to 5,000 rpm and with no installed speed governor are not subject to the provisions of this part through the 2005 model year. Starting with the 2006 model year, all the requirements of this part apply to engines used in these vehicles if they are not included in the scope of part 1051 of this chapter.

7. Section 90.3 is amended by adding definitions for aircraft, hobby engines, marine engine, marine vessel, and United States in alphabetical order, to read as follows:

§90.3 Definitions.

* * * * *

Aircraft means any vehicle capable of sustained air travel above treetop heights.

* * * * *

Hobby engines means engines used in reduced-scale models of vehicles that are not capable of transporting a person (for example, model airplanes).

* * * * *

Marine engine means an engine that someone installs or intends to install on a marine vessel.

Marine vessel means a vehicle that is capable of operation in water but is not capable of operation out of water. Amphibious vehicles are not marine vessels.

* * * * *

Recreational means, for purposes of this part, relating to a vehicle intended by the vehicle manufacturer to be operated primarily for pleasure. Note that snowmobiles, all-terrain vehicles, and off-highway motorcycles are recreational vehicles that we regulate under 40 CFR part 1051.

* * * * *

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands.

* * * * *

Subpart B—[Amended]

8. Section 90.103 is amended by designating paragraph (a)(2)(v) as (a)(2)(vi) and adding a new paragraph (a)(2)(v) to read as follows:

§90.103 Exhaust Emission Standards.

(a) * * *

(2) * * *

(v) The engine must be used in a recreational application, with a combined total vehicle dry weight under 20 kilograms.

(vi) * * *

* * * * *

PART 91—CONTROL OF EMISSIONS FROM MARINE SPARK-IGNITION ENGINES

9. The authority for part 91 continues to read as follows:
Authority: 42 U.S.C. 7521, 7522, 7523, 7524, 7525, 7541, 7542, 7543, 7547, 7549, 7550, and 7601(a).

Subpart A—[Amended]

10. Section 91.3 is amended by adding the definition for United States in alphabetical order to read as follows:

§91.3 Definitions.
* * * * *

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands.
* * * * *

Subpart E—[Amended]

11. Section 91.419 is corrected by revising the equation for M_{HCexh} and revising the equation for M_{exh} by changing + to × to read as follows:

§91.419 Raw emission sampling calculations.
* * * * *
(b) * * *
$M_{HCexh} = 12.01 + 1.008 \times \alpha$
* * * * *
$M_{exh} =$ * * *
$46.01 \times WNOx$
* * *

* * * * *

Subpart G—[Amended]

12. Appendix A to Subpart G of part 91 is corrected by revising the entries in the left-most column of Table 1 to read as follows:
* * * * * * *
20 - 50
20 - 99
100 - 299
300 - 499
500 or greater
* * * * * * *

Subpart I—[Amended]

13. Section 91.803 is amended by revising paragraph (a) to read as follows:

§91.803 Manufacturer in-use testing program.

(a) EPA shall annually identify engine families and those configurations within families which the manufacturers must then subject to in-use testing as described below. For each model year, EPA may identify the following number of engine families for testing, based on the manufacturer's total number of engine families to which this subpart is applicable produced in that model year.

(1) For manufactures with three or fewer engine families, EPA may identify a single engine family.

(2) For manufacturers with four or more engine families, EPA may identify a number of engine families that is no greater than twenty-five percent of the manufacturer's total number of engine families.

* * * * *

PART 94—CONTROL OF EMISSIONS FROM MARINE COMPRESSION-IGNITION ENGINES

14. The title to part 94 is amended as set forth above.

15. The authority citation for part 94 continues to read as follows:

Authority: 42 U.S.C. 7522, 7523, 7524, 7525, 7541, 7542, 7543, 7545, 7547, 7549, 7550 and 7601(a).

Subpart A—[Amended]

16. Section 94.1 is amended to read as follows:

§94.1 Applicability.

(a) Except as noted in paragraphs (b) and (c) of this section, the provisions of this part apply to manufacturers (including post-manufacture marinizers and dressers), rebuilders, owners and operators of:

(1) Marine engines that are compression-ignition engines manufactured (or that otherwise become new) on or after January 1, 2004;

(2) Marine vessels manufactured (or that otherwise become new) on or after January 1, 2004 and which include a compression-ignition marine engine.

(b) Notwithstanding the provision of paragraph (c) of this section, the requirements and prohibitions of this part do not apply to three types of marine engines:

(1) Category 3 marine engines;

(2) Marine engines with rated power below 37 kW; or

(3) Marine engines on foreign vessels.

(c) The provisions of Subpart L of this part apply to everyone with respect to the engines identified in paragraph (a) of this section.

17. Section 94.2 is amended by revising paragraph (b) introductory text, revising definitions for compression-ignition, designated officer, recreational marine engine, and United States and adding new definitions for commercial and spark-ignition in alphabetical order to read as follows:

§94.2 Definitions.

* * * * *

(b) As used in this part, all terms not defined in this section shall have the meaning given them in the Act:

* * *

Commercial means relating to an engine or vessel that is not a recreational engine or a recreational vessel.

* * * * *

Compression-ignition means relating to an engine that is not a spark-ignition engine.

* * * * *

Designated Officer means the Manager, Engine Programs Group (6403-J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., Washington, DC 20460.

* * * * *

Passenger has the meaning given by 46 U.S.C. 2101 (21) and (21a). This generally means that a passenger is a person that pays to be on the vessel.

* * * * *

Recreational marine engine means a Category 1 propulsion marine engine that is intended by the manufacturer to be installed on a recreational vessel, and which is permanently labeled as follows: "THIS ENGINE IS

CATEGORIZED AS A RECREATIONAL ENGINE UNDER 40 CFR PART 94. INSTALLATION OF THIS ENGINE IN ANY NONRECREATIONAL VESSEL IS A VIOLATION OF FEDERAL LAW SUBJECT TO CIVIL PENALTY."

* * * * *

Recreational marine vessel means a vessel that meets the definition of a "recreational vessel" under 46 U.S.C 2101 (25), but excluding "passenger vessels" and "small passenger vessels" as defined by 46 U.S.C. 2101 (22) and (35) and excluding vessels used solely for competition. In general, for this part, "recreational marine vessel" means a vessel that is intended by the vessel manufacturer to be operated primarily for pleasure or leased, rented or chartered to another for the latter's pleasure, excluding the following vessels:

(1) Vessels of less than 100 gross tons that carry more than 6 passengers (as defined in this section).

(2) Vessels of 100 gross tons or more that carry one or more passengers (as defined in this section).

(3) Vessels used solely for competition.

* * * * *

Small-volume boat builder means a boat manufacturer with fewer than 500 employees and with annual U.S.-directed production of fewer than 100 boats. For manufacturers owned by a parent company, these limits apply to the combined production and number of employees of the parent company and all its subsidiaries.

Small-volume manufacturer means a manufacturer with annual U.S.-directed production of fewer than 1,000 internal combustion engines (marine and nonmarine). For manufacturers owned by a parent company, the limit applies to the production of the parent company and all its subsidiaries.

* * * * *

Spark-ignition means relating to a 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.

* * * * *

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands.

* * * * *

18. Section 94.7 is amended by revising paragraphs (e) to read as follows:

§94.7 General standards and requirements.

* * * * *

(e) Electronically controlled engines subject to the emission standards of this part shall broadcast on engine's controller area networks engine torque (as percent of maximum at that speed) and engine speed.

19. Section 94.8 is amended by revising paragraphs (a), (e), and (f) to read as follows:

§94.8 Exhaust emission standards.

(a) Exhaust emissions from marine compression-ignition engines shall not exceed the applicable exhaust emission standards contained in Table A-1 as follows:

Table A-1.– Primary Tier 2 Exhaust Emission Standards (g/kW-hr)

Engine Size liters/cylinder, rated power	Category	Model Year*	THC+NOx g/kW-hr	CO g/kW-hr	PM g/kW-hr
disp. < 0.9 and power ≥ 37 kW	Category 1 Commercial	2005	7.5	5.0	0.40
	Category 1 Recreational	2007	7.5	5.0	0.40
0.9 ≤ disp. < 1.2 all power levels	Category 1 Commercial	2004	7.2	5.0	0.30
	Category 1 Recreational	2006	7.2	5.0	0.30
1.2 ≤ disp. < 2.5 all power levels	Category 1 Commercial	2004	7.2	5.0	0.20
	Category 1 Recreational	2006	7.2	5.0	0.20
2.5 ≤ disp. < 5.0 all power levels	Category 1 Commercial	2007	7.2	5.0	0.20
	Category 1 Recreational	2009	7.2	5.0	0.20
5.0 ≤ disp. < 15.0 all power levels	Category 2	2007	7.8	5.0	0.27
15.0 ≤ disp. < 20.0 power < 3300 kW	Category 2	2007	8.7	5.0	0.50
15.0 ≤ disp. < 20.0 power ≥ 3300 kW	Category 2	2007	9.8	5.0	0.50
20.0 ≤ disp. < 25.0 all power levels	Category 2	2009	9.8	5.0	0.50
25.0 ≤ disp. < 30.0 all power levels	Category 2	2007	11.0	5.0	0.50

* The model years listed indicate the model years for which the specified standards start.

* * * * *

(e) Exhaust emissions from propulsion engines subject to the standards (or FELs) in paragraph (a), (c), or (f) of this section shall not exceed:

(1) Commercial engines. (i) 1.20 times the applicable standards (or FELs) when tested in accordance with the supplemental test procedures specified in §94.106 at loads greater than or equal to 45 percent of the maximum power at rated speed or 1.50 times the applicable standards (or FELs) at loads less than 45 percent of the maximum power at rated speed;

(ii) As an option, the manufacturer may choose to comply with limits of 1.25 times the applicable standards (or FELs) when tested over the whole power range in accordance with the supplemental test procedures specified in §94.106, instead of the limits in paragraph (e)(1)(i) of this section.

(2) Recreational engines. (i) 1.20 times the applicable standards (or FELs) when tested in accordance with the supplemental test procedures specified in §94.106 at loads greater than or equal to 45 percent of the maximum power at rated speed and speeds less than 95 percent of maximum test speed, or 1.50 times the applicable standards (or FELs) at loads less than 45 percent of the maximum power at rated speed, or 1.50 times the

applicable standards (or FELs) at any loads for speeds greater than or equal to 95 percent of the maximum test speed;

(ii) As an option, the manufacturer may choose to comply with limits of 1.25 times the applicable standards (or FELs) when tested over the whole power range in accordance with the supplemental test procedures specified in §94.106, instead of the limits in paragraph (e)(2)(i) of this section.

(f) The following paragraphs define the requirements for low-emitting Blue Sky Series engines.

(1) Voluntary standards. Engines may be designated "Blue Sky Series" engines through the 2010 model year by meeting the voluntary standards listed in Table A-2, which apply to all certification and in-use testing.

Table A-2.—Voluntary Emission Standards (g/kW-hr)

Rated Brake Power (kW)	THC+NOx	PM
power ≥ 37 kW, and displ.<0.9	4.0	0.24
0.9≤displ.<1.2	4.0	0.18
1.2≤displ.<2.5	4.0	0.12
2.5≤displ.<5	5.0	0.12
5≤displ.<15	5.0	0.16
15 ≤ disp. < 20, and power < 3300 kW	5.2	0.30
15 ≤ disp. < 20, and power ≥ 3300 kW	5.9	0.30
20 ≤ disp. < 25	5.9	0.30
25 ≤ disp. < 30	6.6	0.30

* * * * *

20. Section 94.9 is amended by revising paragraph (a)(1) to read as follows:

§94.9 Compliance with emission standards.

(a) The general standards and requirements in §94.7 and the emission standards in §94.8 apply to each new engine throughout its useful life period. The useful life is specified both in years and in hours of operation, and ends when either of the values (hours of operation or years) is exceeded.

(1) The minimum useful life is:

(i) 10 years or 1,000 hours of operation for recreational Category 1 engines;

(i) 10 years or 10,000 hours of operation for commercial Category 1 engines;

(iii)10 years or 20,000 hours of operation for Category 2 engines.

* * * * *

21. Section 94.12 is amended by revising paragraphs (a) and (b)(1) and adding a new paragraph (f) to read as follows:

§94.12 Interim provisions.

This section contains provisions that apply for a limited number of calendar years or model years. These provisions

supercede the other provisions of this part.

(a) Compliance date of standards. Certain companies may delay compliance with emission standards. Companies wishing to take advantage of this provision must inform the Designated Officer of their intent to do so in writing before the date that compliance with the standards would otherwise be mandatory.

(1) Post-manufacture marinizers may elect to delay the model year of the Tier 2 standards for commercial engines as specified in §94.8 by one year for each engine family.

(2) Small-volume manufacturers may elect to delay the model year of the Tier 2 standards for recreational engines as specified in §94.8 by five years for each engine family.

(b) Early banking of emission credits. (1) A manufacturer may optionally certify engines manufactured before the date the Tier 2 standards take effect to earn emission credits under the averaging, banking, and trading program. Such optionally certified engines are subject to all provisions relating to mandatory certification and enforcement described in this part. Manufacturers may begin earning credits for recreational engines on [INSERT DATE 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER].

* * * * *

(f) Flexibility for small-volume boat builders. Notwithstanding the other provisions of this part, manufacturers may sell uncertifed recreational engines to small-volume boat builders during the first five years for which the emission standards in §94.8 apply, subject to the following provisions:

(1) The U.S.-directed production volume of boats from any small-volume boat builder using uncertified engines during the total five-year period may not exceed 80 percent of the manufacturer's average annual production for the three years prior to the general applicability of the recreational engine standards in §94.8, except as allowed in paragraph (f)(2) of this section.

(2) Small-volume boat builders may exceed the production limits in paragraph (f)(1) of this section, provided it does not exceed 20 boats during the five-year period or 10 boats in any single calendar year. This does not apply to boats powered by engines with displacement greater than 2.5 liters per cylinder.

(3) Small-volume boat builders must keep records of all the boats and engines produced under this paragraph (f), including boat and engine model numbers, serial numbers, and dates of manufacture. Records must also include information verifying compliance with the limits in paragraphs (f)(1) or (f)(2) of this section. Keep these records until at least two full years after you no longer use the provisions in this paragraph (f).

Subpart B—[Amended]

22. Section 94.104 is amended by redesignating paragraph (c) as (d), adding a new paragraph (c), and correcting footnotes in Tables B-1 through B-4 to replace "#" with "±" to read as follows:

§94.104 Test Procedures for Category 2 Marine Engines.

* * * * *

(c) Conduct testing at ambient temperatures from 13° C to 30° C.

* * * * *

23. Section 94.105 is amended by revising paragraph (b) and adding a new paragraph (e) to read as follows:

§ 94.105 Duty cycles.

* * * * *

(b) General cycle. Propulsion engines that are used with (or intended to be used with) fixed-pitch propellers, and any other engines for which the other duty cycles of this section don't apply, shall be tested using the duty cycle described in the following Table B-1:

* * * * *

(e) Recreational. For the purpose of determining compliance with the emission standards of §94.8, recreational engines shall be tested using the duty cycle described in Table B-5, which follows:

Table B-5.—Recreational Marine Duty Cycle

Mode Number	Engine Speed(1) (percent of maximum test speed)	Percent of Maximum Test Power(2)	Minimum Time in mode (minutes)	Weighting Factors
1	100	100	5.0	0.08
2	91	75	5.0	0.13
3	80	50	5.0	0.17
4	63	25	5.0	0.32
5	idle	0	5.0	0.30

(1) Engine speed: ± 2 percent of point.

(2) Power: ±2 percent of engine maximum value.

24. Section 94.106 is amended by revising paragraph (b)(1) introductory text, (b)(2) introductory text, and (b)(3) introductory text and adding a new paragraph (b)(5) to read as follows:

§ 94.106 Supplemental test procedures.

* * * * *

(b) The specified Not to Exceed Zones for marine engines are defined as follows. These Not to Exceed Zones apply, unless a modified zone is established under paragraph (c) of this section.

(1) For commercial Category 1 engines certified using the duty cycle specified in §94.105(b), the Not to Exceed zones are defined as follows:

* * * * *

(b) (2) For Category 2 engines certified using the duty cycle specified in §94.105(b), the Not to Exceed zones are

defined as follows:

* * * * *

(b) (3) For engines certified using the duty cycle specified in §94.105(c)(2), the Not to Exceed zones are defined as follows:

* * * * *

(b) (5) For recreational marine engines certified using the duty cycle specified in §94.105(e), the Not to Exceed zones are defined as follows:

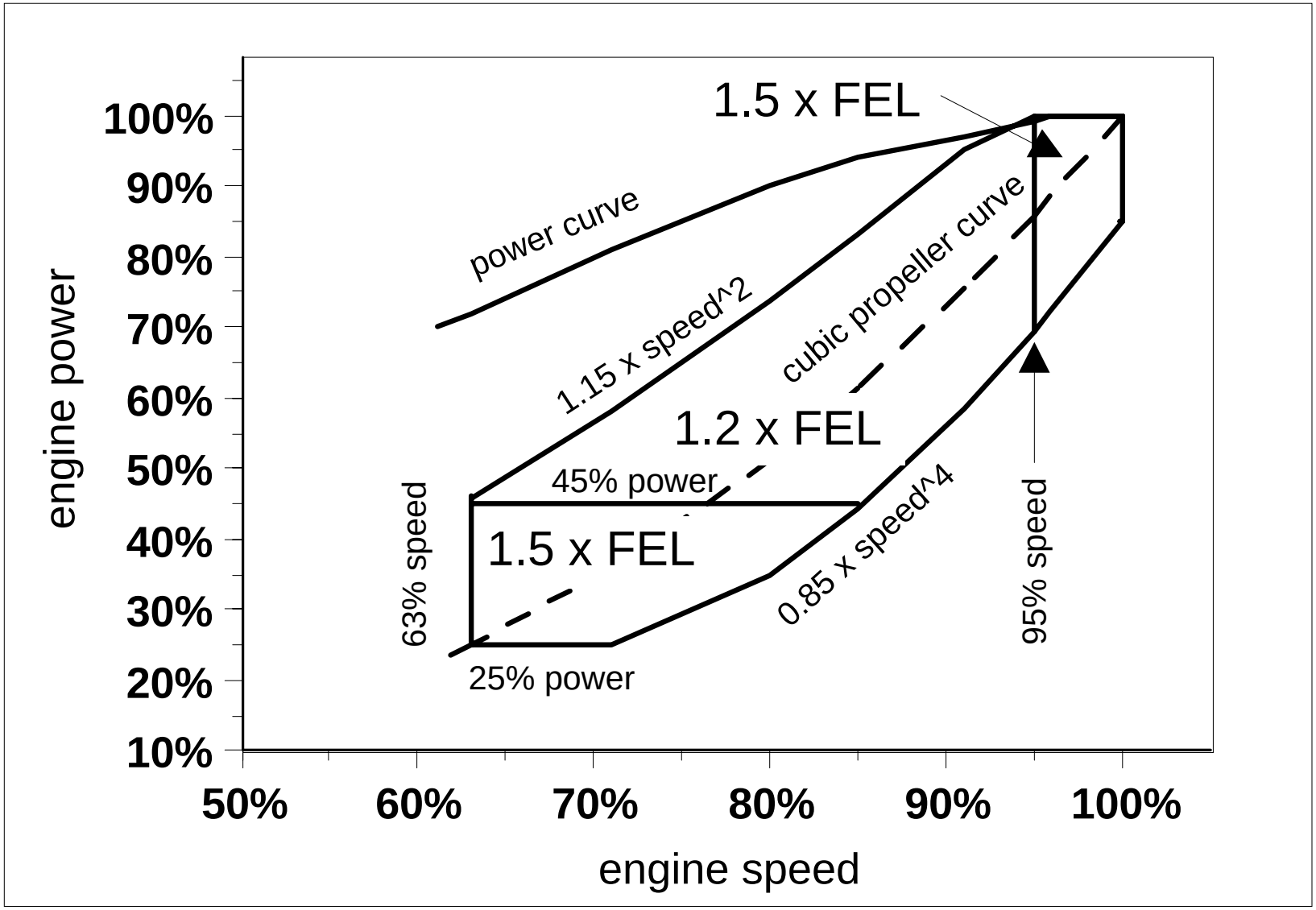
(i) The Not to Exceed zone is the region between the curves power = 1.15 x SPD^2 and power = 0.85 x SPD^4, excluding all operation below 25% of maximum power at rated speed and excluding all operation below 63% of maximum test speed.

(ii) This zone is divided into three subzones, one below 45% of maximum power at maximum test speed; one above 95 % of maximum test speed; and a third area including all of the remaining area of the NTE zone.

(iii) SPD in paragraph (b)(3)(i) of this section refers to percent of maximum test speed.

(iv) See Figure B-4 for an illustration of this Not to Exceed zone.

Figure B-4


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
engine power
50%
60%
70%
80%
90%
100%
engine speed
1.5 x FEL
power curve
1.15 x speed^2
cubic propeller curve
1.2 x FEL
45% power
63% speed
1.5 x FEL
0.85 x speed^4
95% speed
25% power

25. Section 94.108 is amended by revising footnote 1 in Table B-5 to read as follows:

§ 94.108 Test fuels.

* * * * *

1 All ASTM procedures in this table have been incorporated by reference. See §94.5.

* * * * *

Subpart C—[Amended]

26. Section 94.203 is amended by revising paragraphs (d)(14) and (d)(16) to read as follows:

§94.203 Application for certification.

* * * * *

(d) * * *

(14) A statement that all the engines included in the engine family comply with the Not To Exceed standards specified in §94.8(e) when operated under all conditions which may reasonably be expected to be encountered in normal operation and use; the manufacturer also must provide a detailed description of all testing, engineering analyses, and other information which provides the basis for this statement.

* * * * *

(d) (16) A statement indicating duty-cycle and application of the engine (e.g., used to propel planing vessels, use to propel vessels with variable-pitch propellers, constant-speed auxiliary, recreational, etc.).

* * * * *

27. Section 94.204 is amended by revising paragraph (e) and adding a new paragraph (b)(11) to read as follows:

§94.204 Designation of engine families.

* * * * *

(b) * * *

(11) Class (commercial or recreational).

* * * * *

(e) Upon request by the manufacturer, the Administrator may allow engines that would be required to be grouped into separate engine families based on the criteria in paragraph (b) or (c) of this section to be grouped into a single engine family if the manufacturer demonstrates that the engines will have similar emission characteristics; however, recreational and commercial engines may not be grouped in the same engine family. This request must be accompanied by emission information supporting the appropriateness of such combined engine families.

28. Section 94.209 is revised to read as follows:

§94.209 Special provisions for post-manufacture marinizers and small-volume manufacturers.

(a) Broader engine families. Instead of the requirements of §94.204, an engine family may consist of any engines subject to the same emission standards. This does not change any of the requirements of this part for showing that an engine family meets emission standards. To be eligible to use the provisions of this paragraph (a), the manufacturer must demonstrate one of the following:

(1) It is a post-manufacture marinizer and that the base engines used for modification have a valid certificate of conformity issued under 40 CFR part 89 or 40 CFR part 92 or the heavy-duty engine provisions of 40 CFR part 86.

(2) It is a small-volume manufacturer.

(b) Hardship relief. Post-manufacture marinizers, small-volume manufacturers, and small-volume boat builders may take any of the otherwise prohibited actions identified in §94.1103(a)(1) if approved in advance by the Administrator, subject to the following requirements:

(1) Application for relief must be submitted to the Designated Officer in writing prior to the earliest date in which the applying manufacturer would be in violation of §94.1103. The manufacturer must submit evidence showing that the requirements for approval have been met.

(2) The conditions causing the impending violation must not be substantially the fault of the applying manufacturer.

(3) The conditions causing the impending violation must jeopardize the solvency of the applying manufacturer if relief is not granted.

(4) The applying manufacturer must demonstrate that no other allowances under this part will be available to avoid the impending violation.

(5) Any relief may not exceed one year beyond the date relief is granted.

(6) The Administrator may impose other conditions on the granting of relief including provisions to recover the lost environmental benefit.

(c) Extension of deadlines. Small-volume manufacturers may use the provisions of 40 CFR 1068.241 to ask for an extension of a deadline to meet emission standards. We may require that you use available base engines that have been certified to emission standards for land-based engines until you are able to produce engines certified to the requirements of this part.

29. Section 94.212 is amended by revising paragraph (b)(10) to read as follows:

§94.212 Labeling.

* * * * *

(b) Engine labels. * * *

(10) The application for which the engine family is certified. (For example: constant-speed auxiliary, variable-speed propulsion engines used with fixed-pitch propellers, recreational , etc.)

* * * * *

30. Section 94.218 is amended by adding a new paragraph (d)(2)(iv) to read as follows:

§94.218 Deterioration factor determination.

* * * * *

(d) * * *

(2) * * *

(iv) Assigned deterioration factors. Small-volume manufacturers may use deterioration factors established by EPA.

Subpart D—[Amended]

31. Section 94.304 is amended by revising paragraph (k) to read as follows:

§94.304 Compliance requirements.

* * * * *

(k) The following provisions limit credit exchanges between different types of engines:

(1) Credits generated by Category 1 engine families may be used for compliance by Category 1 or Category 2 engine families. Credits generated from Category 1 engine families for use by Category 2 engine families must be discounted by 25 percent.

(2) Credits generated by Category 2 engine families may be used for compliance only by Category 2 engine families.

(3) Credits may not be exchanged between recreational and commercial engines.

* * * * *

Subpart F—[Amended]

32. Section 94.501 is amended by revising paragraph (a) to read as follows:

§94.501 Applicability.
(a) The requirements of this subpart are applicable to manufacturers of engines subject to the provisions of Subpart A of this part, excluding small-volume manufacturers.
* * * * *

33. Section 94.503 is amended by adding a new paragraph (d) to read as follows:

§94.503 General requirements.
(d) If you certify an engine family with carryover emission data, as described in §94.206(c), and these equivalent engine families consistently meet the emission standards with production-line testing over the preceding two-year period, you may ask for a reduced testing rate for further production-line testing for that family. The minimum testing rate is one engine per engine family. If we reduce your testing rate, we may limit our approval to a single model year.
* * * * *

Subpart J—[Amended]

34. Section 94.907 is amended by revising paragraphs (d) and (g) to read as follows:

§94.907 Engine dressing exemption.
* * * * *
(d) New marine engines that meet all the following criteria are exempt under this section:
(1) You must produce it by marinizing an engine covered by a valid certificate of conformity from one of the following programs:
(i) Heavy-duty highway engines (40 CFR 86).
(ii) Land-based nonroad diesel engines (40 CFR 89).
(iii) Locomotive engines (40 CFR 92).
(2) The engine must have the label required under 40 CFR Part 86, 89, or 92.
(3) You must not make any changes to the certified engine that could reasonably be expected to increase its emissions. For example, if you make any of the following changes to one of these engines, you do not qualify for the engine dressing exemption:
(i) Changing any fuel system parameters from the certified configuration.
(ii) Replacing an original turbocharger, except that small-volume manufacturers of recreational engines may replace an original turbocharger with one that matches the performance of the original turbocharger.
(iii) Modify or design the marine engine cooling or aftercooling system so that temperatures or heat rejection rates are outside the original engine manufacturer's specified ranges.
(4) You must make sure that fewer than 50 percent of the engine model’s total sales, from all companies, are used in marine applications..
* * * * *
(g) If your engines don’t meet the criteria listed in paragraphs (d)(2) through (d)(4) of this section, they will be subject to the standards and prohibitions of this part. Marinization without a valid exemption or certificate of conformity would be a violation of §94.1103(a)(1) and/or the tampering prohibitions of the applicable land-based regulations (40 CFR Parts 86, 89, or 92).
* * * * *

Subpart K—[Amended]

35. Section 941103 is amended by revising paragraph (a)(5) to read as follows:

§94.1103 Prohibited acts.

(a) * * *

(5) For a manufacturer of marine vessels to distribute in commerce, sell, offer for sale, or deliver for introduction into commerce a new vessel containing an engine not covered by a certificate of conformity applicable for an engine model year the same as or later than the calendar year in which the manufacture of the new vessel is initiated. Note: For the purpose of this paragraph, the manufacture of a vessel is initiated when the keel is laid, or the vessel is at a similar stage of construction. In general, you may use up your normal inventory of engines not certified to new emission standards if they were built before the date of the new standards. However, we consider stockpiling of these engines to be a violation of paragraph (a)(1)(i)(A) of this section.

37. A new subchapter U is added to read as follows:

SUBCHAPTER U—AIR POLLUTION CONTROLS

PART 1048—CONTROL OF EMISSIONS FROM NEW, LARGE NONROAD SPARK-IGNITION ENGINES

Subpart A—Determining how to follow this part

Sec.

Subpart B—Emission standards and related requirements

Subpart C—Certifying engine families

Subpart D—Testing production-line engines

Subpart E—Testing in-use engines

Subpart F—Test procedures

Subpart G—Compliance provisions

Subpart H—Definitions and Other Reference Information

Authority: 42 U.S.C. 7401 - 7671(q)

Subpart A—Determining how to follow this part

§1048.001 Does this part apply to me?
(a) This part applies to you if you manufacture or import new, spark-ignition, nonroad engines (defined in §1048.701) with rated power above 19 kW, unless we exclude them under §1048.005.
(b) If you manufacture or import engines with rated power at or below 19 kW that would otherwise be covered by 40 CFR part 90, you may choose to meet the requirements of this part instead. In this case, all the provisions of this part apply for those engines.
(c) Note in subpart G of this part that part 1068 of this chapter applies to everyone, including anyone who manufactures, installs, owns, operates, or rebuilds any of the engines this part covers or equipment containing these engines.
(d) You need not follow this part for engines you produce before the 2004 model year, unless you certify voluntarily. See §1048.100, §1048.145, and the definition of model year in §1048.701 for more information about the timing of new requirements.
(e) See §§1048.701 and 1048.705for definitions and acronyms that apply to this part.

§1048.005 May I exclude any engines from this part's requirements?
(a) You may exclude the following nonroad engines:
(1) Engines used in snowmobiles, all-terrain vehicles, or off-highway motorcycles and regulated in 40 CFR part 1051.
(2) Propulsion marine engines. See 40 CFR part 91 and 1045. This part applies with respect to auxiliary marine engines.
(b) You may exclude engines used in aircraft. See 40 CFR part 87.
(c) You may exclude stationary engines, except that you must meet the requirements in §1048.020. In addition, the prohibitions in §1068.101 restrict the use of stationary engines for non-stationary purposes.
(d) See subpart G of this part and part 1068, subpart C of this chapter for exemptions of specific engines.
(e) Send the Designated Officer a written request if you want us to determine whether this part covers or excludes certain engines. Another part of the CFR may regulate engines we exclude from this part.

§1048.010 What main steps must I take to comply with this part?
(a) You must have a certificate of conformity from us for each engine family before you do any of the following with a new engine covered by this part: sell, offer for sale, introduce into commerce, distribute or deliver for introduction into commerce, or import it into the United States. "New" engines may include some already placed in service (see the definition of "new nonroad engine" and "new nonroad equipment" in §1048.701). You must get a new certificate of conformity for each new model year.
(b) To get a certificate of conformity and comply with its terms, you must do five things:
(1) Meet the emission standards and other requirements in subpart B of this part.
(2) Apply for certification (see subpart C of this part).
(3) Do routine emission testing on production engines (see subpart D of this part).
(4) Do emission testing on in-use engines, as we direct (see subpart E of this part).
(5) Follow our instructions throughout this part.
(c) Subpart F of this part and part 1065 describe the procedures you must follow to test your engines.
(d) Subpart G of this part and part 1068 describe requirements and prohibitions that apply to engine manufacturers, equipment manufacturers, owners, operators, rebuilders, and all others.

§1048.015 Do any other regulation parts affect me?
(a) Part 1065 of this chapter describes procedures and equipment specifications for testing engines. Subpart F of this part describes how to apply the provisions of part 1065 to show you meet the emission standards in this part.
(b) Part 1068 of this chapter describes general provisions, including these seven areas:

(1) Prohibited acts and penalties for engine manufacturers, equipment manufacturers, and others.
(2) Rebuilding and other aftermarket changes.
(3) Exemptions for certain engines.
(4) Importing engines.
(5) Selective enforcement audits of your production.
(6) Defect reporting and recall.
(7) Procedures for public hearings.

(c) Other parts of this chapter affect you if referenced in this part.

§1048.020 What requirements from this part apply to my excluded engines?

(a) Manufacturers of stationary engines that would otherwise need to meet the requirements of this part must add a permanent label or tag identifying each engine. This applies equally to importers. To meet labeling requirements, you must do the following things:

(1) Attach the label or tag in one piece so no one can remove it without destroying or defacing it.
(2) Make sure it is durable and readable for the engine's entire life.
(3) Secure it to a part of the engine needed for normal operation and not normally requiring replacement.
(4) Write it in block letters in English.
(5) Instruct equipment manufacturers that they must place a duplicate label as described in §1068.105 of this chapter if they obscure the engine's label.

(b) Engine labels or tags required under this section must have the following information:

(1) Include the heading "Emission Control Information."
(2) Include your full corporate name and trademark.
(3) State the engine displacement (in liters) and rated power.
(4) State: "THIS ENGINE IS EXCLUDED FROM THE REQUIREMENTS OF 40 CFR PART 1048 AS A "STATIONARY ENGINE." INSTALLING OR USING THIS ENGINE IN ANY OTHER APPLICATION MAY BE A VIOLATION OF FEDERAL LAW SUBJECT TO CIVIL PENALTY.

Subpart B—Emission standards and related requirements

§1048.101 What exhaust emission standards must my engines meet?

(a) The exhaust emission standards in Table 1 of §1048.101 apply for steady-state measurement of emissions with the duty-cycle test procedures in subpart F of this part:

Table 1 of §1048.101 Steady-State Duty-Cycle Emission Standards (g/kW-hr)

Model Year	Emission standards		Alternate emission standards	
	HC+NOx	CO	HC+NOx	CO
2004 - 2006	4.0	50.0	—	—
2007 and later	3.4	3.4	1.3	27.0

(b) The exhaust emission standards in Table 2 of §1048.101 apply for transient measurement of emissions with the duty-cycle test procedures in subpart F of this part:

Table 2 of §1048.101 Transient Duty-Cycle Emission Standards (g/kW-hr)

Model Year	Emission standards		Alternate emission standards	
	HC+NOx	CO	HC+NOx	CO
2007 and later	3.4	3.4	1.3	27.0

(c) The exhaust emission standards in Table 3 of §1048.101 apply for emission measurements with the field-test procedures in subpart F of this part:

Table 3 of §1048.101 Field-testing Emission Standards (g/kW-hr)

Model Year	Emission standards		Alternate emission standards	
	HC+NOx	CO	HC+NOx	CO
2007 and later	4.7	5.0	1.8	41.0

(d) You may choose to meet the alternate emission standards instead of the regular emission standards, as described in paragraphs (a) through (c) of this section.

(e) The standards apply for the model years listed in the tables in this section. You may choose to certify earlier model years.

(f) Apply the exhaust emission standards in this section for engines using all fuels. You must meet the numerical emission standards for hydrocarbons in this section based on the following types of hydrocarbon emissions for engines powered by the following fuels:

(1) Gasoline- and LPG-fueled engines: THC emissions.

(2) Natural gas-fueled engines: NMHC emissions (for testing to show that these engines meet the emission standards in paragraph (c) of this section, disregard hydrocarbon emissions).

(3) Alcohol-fueled engines: THCE emissions.

(g) Certain engines with total displacement at or below 1000 cc may comply with the requirements of 40 CFR part 90 instead of complying with the emission standards in this section, as described in §1048.615.

(h) You must show in your certification application that your engines meet the exhaust emission standards in paragraphs (a) through (c) of this section over their full useful life. The minimum useful life is 5,000 hours of

operation or seven years, whichever comes first. Specify a longer useful life under either of two conditions:

(1) If you design, advertise, or market your engine to operate longer than the minimum useful life (your recommended time until rebuild may indicate a longer design life).

(2) If your basic mechanical warranty is longer than the minimum useful life.

(i) Refer to §1048.240 to apply deterioration factors.

(j) Apply this subpart to all testing, including production-line and in-use testing, as described in subparts D and E of this part.

§1048.105 What steps must I take to address evaporative emissions?

(a) Starting in the 2007 model year, if you produce an engine that runs on a volatile liquid fuel (such as gasoline), you must take the following steps to address evaporative emissions:

(1) Specify and incorporate design features to avoid venting fuel vapors directly to the atmosphere. Evaporative hydrocarbon emissions must be less than 0.2 grams per gallon of fuel tank capacity during a nine-hour period of gradually increasing ambient temperatures from 22 to 36° C with fuel meeting the specifications in 40 CFR 1065.210, when measured from an engine with a complete fuel system using the equipment and procedures specified in 40 CFR 86.107-96 and 86.133-96. You may rely on any of the following designs instead of doing emission tests to show that you meet this requirement:

(i) Use a tethered or self-closing gas cap on a fuel tank that stays sealed up to a positive pressure of 24.5 kPa (3.5 psi) or a vacuum pressure of 10.5 kPa (1.5 psi).

(ii) Use a tethered or self-closing gas cap on a fuel tank that stays sealed up to a positive or vacuum pressure of 7 kPa (1 psi). Use an inflatable, nonpermeable bag that occupies the vapor space inside the fuel tank, exchanging air with the ambient as needed to prevent pressure buildup in the tank. The volume of the inflatable bag must be at least 30 percent of the total tank volume.

(iii) Use a tethered or self-closing gas cap on a fuel tank that stays sealed except for venting to a charcoal canister. The engine must be designed to draw hydrocarbons from the canister into the engine's combustion chamber as needed to prevent evaporative emissions during normal operation.

(iv) Use a tethered or self-closing gas cap on a collapsible bladder tank. A collapsible bladder tank is one that changes in volume as needed to accommodate the changing amount of liquid fuel, thus eliminating the vapor space.

(2) For nonmetallic fuel lines, specify and use products that meet the Category 1 specifications in SAE J2260 "Nonmetallic Fuel System Tubing with One or More Layers," November 1996 (incorporated by reference in §1048.710).

(3) Liquid fuel in the fuel tank may not reach boiling during continuous engine operation in the final installation at an ambient temperature of 30° C. Gasoline with a volatility of 9 RVP begins to boil at about 53° C. You may satisfy this requirement by specifying and incorporating design features to prevent fuel boiling under all normal operation.

(b) If other companies install your engines in their equipment, give them any appropriate instructions, as described in §1048.130.

§1048.110 How must my engines diagnose malfunctions?

(a) Equip your engines with a diagnostic system. Starting in the 2007 model year, make sure your system will detect significant malfunctions in its emission-control system using one of the following protocols.

(1) If your emission-control strategy depends on maintaining air-fuel ratios at stoichiometry, an acceptable diagnostic design would identify malfunction whenever the air-fuel ratio doesn't cross stoichiometry for one minute. You may use other diagnostic strategies if we approve them in advance.

(2) If the protocol described in paragraph (a)(1) of this section does not apply to your engine, you must use an alternative approach that we approve in advance.

(b) Use a malfunction-indicator light (MIL). Make sure the MIL is readily visible to the operator; it may be any color except red. When the MIL goes on, it must display "Check Engine," "Service Engine Soon," or a similar message that we approve. You may use sound in addition to the light signal. The MIL must go on under each of these circumstances:

(1) When a malfunction occurs, as described in paragraph (a) of this section.

(2) When the diagnostic system can't send signals to meet the requirement of paragraph (b)(1) of this section.

(3) When the engine's ignition is in the "key-on" position before starting or cranking. The MIL should go out after engine starting if the system detects no malfunction.

(c) Control when the MIL can go out. If the MIL goes on to show a malfunction, it must remain on during all later engine operation until servicing corrects the malfunction. If the engine isn't serviced, but the malfunction doesn't recur for three consecutive engine starts during which the malfunctioning system is evaluated and found to be working properly, the MIL may stay off during later engine operation.

(d) Store trouble codes in computer memory. Record and store in computer memory any diagnostic trouble codes showing a malfunction that should illuminate the MIL. The stored codes must identify the malfunctioning system or component as uniquely as possible. Make these codes available through the data link connector as described in paragraph (g) of this section. You may store codes for conditions that don't turn on the MIL. The system must store a separate code to show when the diagnostic system is disabled (from malfunction or tampering).

(e) Make data, access codes, and devices accessible. Make all required data accessible to us without any access codes or devices that only you can supply. Ensure that anyone servicing your engine can read and understand the diagnostic trouble codes stored in the onboard computer with generic tools and information.

(f) Consider exceptions for certain conditions. Your diagnostic systems may disregard trouble codes for the first three minutes after engine starting. You may ask us to approve diagnostic-system designs that disregard trouble codes under other conditions that would produce an unreliable reading, damage systems or components, or cause other safety risks. This might include operation at altitudes over 8,000 feet.

(g) Follow standard references for formats, codes, and connections. Follow conventions defined in the following documents (incorporated by reference in §1048.710), or ask us to approve using updated versions of these documents:

(1) ISO 9141-2 "Road vehicles—Diagnostic systems—Part 2: CARB requirements for interchange of digital information," (February 1994).

(2) ISO 14230-4 "Road vehicles—Diagnostic systems—KWP 2000 requirements for Emission-related systems," (June 2000).

§1048.115 What other requirements must my engines meet?

(a) Closed crankcase. Design and produce your engines so they release no crankcase emissions into the atmosphere.

(b) Torque broadcasting. Electronically controlled engines must broadcast their speed and output shaft torque (in newton-meters) on their controller area networks. Engines may alternatively broadcast a surrogate value for torque that can be read with a remote device. This information is necessary for testing engines in the field (see §1065.515 of this chapter). This requirement applies beginning in the 2007 model year.

(c) EPA access to broadcast information. If we request it, you must provide us any hardware or tools we would need to readily read, interpret, and record all information broadcast by an engine's on-board computers and electronic control modules. If you broadcast a surrogate parameter for torque values, you must provide us what we need to convert these into torque units. We will not ask for hardware or tools if they are readily available commercially.

(d) Emission sampling capability. Produce all your engines to allow sampling of exhaust emissions in the field. This sampling requires either exhaust ports downstream of any aftertreatment devices or the ability to extend the exhaust pipe by 20 cm. This is necessary to minimize any diluting effect from ambient air at the end of the exhaust pipe.

(e) Adjustable parameters. If your engines have adjustable parameters, make sure they meet all the requirements of this part for any adjustment in the physically available range.

(1) We don't consider an operating parameter adjustable if you permanently seal it or if ordinary tools can't readily access it.

(2) We may require that you set adjustable parameters to any specification within the adjustable range during certification testing, production-line testing, selective enforcement auditing, or any required in-use testing.

(f) Prohibited controls. You may not design engines with an emission-control system that emits any noxious or toxic substance that the engine would not emit during operation in the absence of such a system, except as specifically permitted by regulation.

(g) Defeat devices. You may not equip your engines with a defeat device. A defeat device is an auxiliary emission-control device or other control feature that reduces the effectiveness of emission controls under conditions you may reasonably expect the engine to encounter during normal operation and use. This does not apply to auxiliary emission-control devices you identify in your certification application if any of the following is true:

(1) The conditions of concern were substantially included in your prescribed duty cycles.

(2) You show your design is necessary to prevent catastrophic engine (or equipment) damage or accidents.

(3) The reduced effectiveness applies only to starting the engine.

§1048.120 What warranty requirements apply to me?

(a) You must warrant to the ultimate buyer that the new engine meets two conditions:

(1) You have designed, built, and equipped it to meet the requirements of this part.

(2) It is free from defects in materials and workmanship that may keep it from meeting these requirements.

(b) Your emission-related warranty must be valid for at least 50 percent of the engine's useful life in hours of operation or at least three years, whichever comes first. In the case of a high-cost warranted part, the warranty must be valid for at least 70 percent of the engine's useful life in hours of operation or at least five years, whichever comes first. You may offer a warranty more generous than we require. This warranty may not be shorter than any published or negotiated warranty you offer for the engine or any of its components. If an engine has no tamper-proof hour meter, we base the warranty periods in this paragraph only on the engine's age (in years).

(c) The emission-related warranty must cover components whose failure would increase an engine's emissions, includeing electronic controls, fuel injection (for liquid or gaseous fuels), exhaust-gas recirculation, aftertreatment, or any other system you develop to control emissions. In general, we consider replacing or repairing other components to be the owner's responsibility.

(d) You may exclude from your warranty a component named in paragraph (c) of this section, if it meets both of the following conditions:

(1) It was in general use on similar engines before January 1, 2000.

(2) Its failure would clearly degrade the engine's performance enough that the operator would need to repair or replace it.

(e) You may limit your emission-related warranty's validity to properly maintained engines, as described in §1068.115 of this chapter.

(f) If you make an aftermarket part, you may—but do not have to—certify that using the part will still allow engines to meet emission standards, as described in §85.2114 of this chapter.

§1048.125 What maintenance instructions must I give to buyers?

Give the ultimate buyer of each new engine written instructions for properly maintaining and using the engine, including the emission-control system. The maintenance instructions also apply to service accumulation on your test engines, as described in 40 CFR part 1065, subpart E.

(a) Critical emission-related maintenance. You may schedule critical maintenance on particular devices if you meet the following conditions:

(1) You may ask us to approve maintenance on air-injection, fuel-system, or ignition components, aftertreatment devices, exhaust gas recirculation systems, crankcase ventilation valves, or oxygen sensors only if it meets two criteria:

(i) Operators are reasonably likely to do the maintenance you call for.

(ii) Engines need the maintenance to meet emission standards.

(2) We will accept scheduled maintenance as reasonably likely to occur in use if you satisfy any of four conditions:

(i) You present data showing that, if a lack of maintenance increases emissions, it also unacceptably degrades the engine's performance.

(ii) You present survey data showing that 80 percent of engines in the field get the maintenance you specify at the recommended intervals.

(iii) You provide the maintenance free of charge and clearly say so in maintenance instructions for the customer.

(iv) You otherwise show us that the maintenance is reasonably likely to be done at the recommended

intervals.

(b) Minimum maintenance intervals. You may not schedule emission-related maintenance within the minimum useful life period for aftertreatment devices, fuel injectors, sensors, electronic control units, and turbochargers.

(c) Noncritical emission-related maintenance. For engine parts not listed in paragraph (a) or (b) of this section, you may recommend any additional amount of inspection or maintenance. But you must state clearly that these steps are not necessary to keep the emission-related warranty valid. Also, do not take these inspection or maintenance steps during service accumulation on your test engines.

(d) Source of parts and repairs. Print clearly on the first page of your written maintenance instructions that any repair shop or person may maintain, replace, or repair emission-control devices and systems. Make sure your instructions require no component or service identified by brand, trade, or corporate name. Also, do not directly or indirectly distinguish between service by companies with which you have a commercial relationship and service by independent repair shops or the owner. You may disregard this paragraph's requirements if you do one of two things:

(1) Provide a component or service without charge under the purchase agreement.

(2) Get us to waive this prohibition in the public's interest by convincing us the engine will work properly only with the identified component or service.

§1048.130 What installation instructions must I give to equipment manufacturers?

(a) If you sell an engine for someone else to install in a piece of nonroad equipment, give the buyer of the engine written instructions for installing it consistent with the requirements of this part. Make sure these instructions have the following information:

(1) Include the heading: "Emission-related installation instructions."

(2) State: "Failing to follow these instructions when installing a certified engine in a piece of nonroad equipment violates federal law (40 CFR 1068.105(b)), subject to fines or other penalties as described in the Clean Air Act."

(3) Describe any other instructions needed to install an exhaust aftertreatment device consistent with your application for certification.

(4) Describe the steps needed to control evaporative emissions, as described in §1048.105.

(5) Describe any necessary steps for installing the diagnostic system described in §1048.110.

(6) Describe any limits on the range of applications needed to ensure that the engine operates consistently with your application for certification. For example, if your engines are certified only for constant-speed operation, tell equipment manufacturers not to install the engines in variable-speed applications. Also, if you need to avoid sustained high-load operation to meet the field-testing emission standards we specify in §1048.101(c), describe how the equipment manufacturer must properly size the engines for a given application.

(7) Describe any other instructions to make sure the installed engine will operate according to design specifications in your application for certification.

(8) State: "If you obscure the engine's emission label, you must place a duplicate label on your equipment, as described in 40 CFR 1068.105."

(b) You don't need installation instructions for engines you install in your own equipment.

§1048.135 How must I label and identify the engines I produce?

(a) Assign each production engine a unique identification number and permanently and legibly affix or engrave it on the engine.

(b) At the time of manufacture, add a permanent label identifying each engine. To meet labeling requirements, do four things:

(1) Attach the label in one piece so it is not removable without being destroyed or defaced.

(2) Design and produce it to be durable and readable for the engine's entire life.

(3) Secure it to a part of the engine needed for normal operation and not normally requiring replacement.

(4) Write it in block letters in English.

(c) On your engine label, do 13 things:

(1) Include the heading "EMISSION CONTROL INFORMATION."

(2) Include your full corporate name and trademark.

(3) State: "THIS ENGINE IS CERTIFIED TO OPERATE ON [specify operating fuel or fuels]."
(4) Identify the emission-control system; your identifiers must use names and abbreviations consistent with SAE J1930, which we incorporate by reference (see §1048.710).
(5) List all requirements for fuel and lubricants.
(6) State the date of manufacture [DAY (optional), MONTH, and YEAR]; if you stamp this information on the engine and print it in the owner's manual, you may omit it from the label.
(7) State: "THIS ENGINE MEETS U.S. ENVIRONMENTAL PROTECTION AGENCY REGULATIONS FOR [MODEL YEAR] LARGE NONROAD SI ENGINES."
(8) Include EPA's standardized designation for the engine family.
(9) State the engine's displacement (in liters) and rated power.
(10) State the engine's useful life (see §1048.101(h)).
(11) List specifications and adjustments for engine tuneups; show the proper position for the transmission during tuneup and state which accessories should be operating.
(12) Describe other information on proper maintenance and use.
(13) Identify the emission standards to which you have certified the engine.

(d) Some of your engines may need more information on the label.
(1) If you have an engine family that has been certified only for constant-speed engines, add to the engine label "CONSTANT-SPEED ONLY."
(2) If you certify an engine to the voluntary standards in §1048.140, add to the engine label "BLUE SKY SERIES."
(3) If you produce an engine we exempt from the requirements of this part, see 40 CFR part 1068, subparts C and D, for more label information.

(e) Some engines may not have enough space for a label with all the required information. In this case, you may omit the information required in paragraphs (c)(3), (c)(4), (c)(5), and (c)(12) of this section if you print it in the owner's manual instead.

(f) If you are unable to meet these labeling requirements, you may ask us to modify them consistent with the intent of this section.

(g) If you obscure the engine label while installing the engine in the vehicle, you must place a duplicate label on the vehicle. If someone else installs the engine in a vehicle, give them duplicate labels if they ask for them (see §1068.105).

§1048.140 How do I certify my engines to more stringent, voluntary standards?

This section defines voluntary standards that allow you to produce engines with a recognized level of superior emission control. We refer to these as "Blue Sky Series" engines. If you certify engines under this section, they must meet one of the following standards:

(a) For the 2003 model year, an engine family may qualify for designation as "Blue Sky Series" by meeting all the requirements in this part that apply to 2004 model year engines. This includes all testing and reporting requirements.

(b) For the 2003 through 2006 model years, an engine family may qualify for designation as "Blue Sky Series" by meeting all the requirements in this part that apply to 2007 model year engines. This includes all testing and reporting requirements.

(c) Any engine family may qualify for designation as "Blue Sky Series" by meeting all the requirements in this part, while certifying to the following voluntary emission standards:
(1) 1.3 g/kW-hr HC+NOx and 3.4 g/kW-hr CO using steady-state and transient test procedures, as described in subpart F of this part.
(2) 1.8 g/kW-hr HC+NOx and 4.7 g/kW-hr CO using field-testing procedures, as described in subpart F of this part.

§1048.145 What provisions apply only for a limited time?

The provisions in this section apply instead of other provisions in this part. This section describes when these interim provisions expire.

(a) Family banking. You may certify an engine family to comply with all the 2007 model year requirements before

2007. For each year of early compliance for an engine family, you may delay certification by one year for a different engine family with smaller projected power-weighted nationwide sales. For example, if you sell 1,000 engines with an average power rating of 50 kW certified a year early, you may delay certification for another engine family with an average power rating of 100 kW of up to 500 engines. You must notify us as soon as you are aware of such a discrepancy between projected and actual sales.

(b) Hydrocarbon standards. For 2004 through 2006 model years, manufacturers may use nonmethane hydrocarbon measurements to demonstrate compliance with applicable emission standards.

(c) Transient emission testing. Engines rated over 560 kW are exempt from the transient emission standards in §1048.101(b).

(d) In-use emission credits with steady-state testing. You may generate credits for the in-use averaging program described in §1048.415 using steady-state test procedures for 2004 through 2006 model years.

(e) Optional early field testing. For 2004 through 2006 model years, manufacturers may optionally use the field-testing procedures in subpart F of this part for any in-use testing required under subpart E of this part. In this case, the same emission standards apply to both steady-state testing and field testing.

(f) Small-volume provisions. Special provisions apply to you if you manufacture fewer than 300 engines per year that are subject to the standards of this part.

(1) For 2004 through 2006 model year engines, the lawn and garden exemption described in 1048.615 applies to your engines with total displacement up to 2500 cc with rated power at or below 30 kW. To qualify for this exemption, you must meet a CO emission standard of 130 g/kW-hr using the procedures specified in 40 CFR part 90.

(2) For 2007 through 2009 model year engines, you may optionally comply with the emission standards and other requirements that would otherwise apply starting in 2004.

(3) If you qualify for the hardship provisions in §1068.241 of this chapter, we may approve extensions of up to three years total.

Subpart C—Certifying engine families

§1048.201 What are the general requirements for submitting a certification application?
(a) Send us an application for a certificate of conformity for each engine family. Each application is valid for only one model year.
(b) The application must not include false or incomplete statements or information (see §1048.250). We may choose to ask you to send us less information than we specify in this subpart, but this would not change your recordkeeping requirements.
(c) Use good engineering judgment for all decisions related to your application (see §1068.005 of this chapter).
(d) An authorized representative of your company must approve and sign the application.

§1048.205 How must I prepare my application?
In your application, you must do all the following things:
(a) Describe the engine family's specifications and other basic parameters of the engine's design. List the types of fuel you intend to use to certify the engine family (for example, gasoline, liquefied petroleum gas, methanol, or natural gas).
(b) Explain how the emission-control system operates. Describe in detail all the system's components, auxiliary emission-control devices, and all fuel-system components you will install on any production or test engine. Explain why any auxiliary emission-control devices are not defeat devices (see §1048.115(g)). Don't include detailed calibrations for components unless we ask for them.
(c) Explain how the engine diagnostic system works, describing especially the engine conditions (with the corresponding diagnostic trouble codes) that cause the malfunction-indicator light to go on. Propose what you consider to be extreme conditions under which the diagnostic system should disregard trouble codes, as described in §1048.110.
(d) Describe the engines you selected for testing and the reasons for selecting them.
(e) Describe any special or alternate test procedures you used (see §1048.501).
(f) Identify the duty cycle and the number of engine operating hours used to stabilize emission levels. Describe any scheduled maintenance you did.
(g) List the specifications of the test fuel to show that it falls within the required ranges we specify in 40 CFR part 1065, subpart C.
(h) Identify the engine family's useful life.
(i) Propose maintenance and use instructions for the ultimate buyer of each new engine (see §1048.125).
(j) Propose emission-related installation instructions if you sell engines for someone else to install in a piece of nonroad equipment (see §1048.130).
(k) Identify each high-cost warranted part and show us how you calculated its replacement cost, including the estimated retail cost of the part, labor rates, and labor hours to diagnose and replace defective parts.
(l) Propose an emission-control label.
(m) Present emission data for HC, NOx, and CO on a test engine to show your engines meet the duty-cycle emission standards we specify in §1048.101(a) and (b). Show these figures before and after applying deterioration factors for each engine. Include test data for each type of fuel on which you intend for engines in the engine family to operate (for example, gasoline, liquefied petroleum gas, methanol, or natural gas).
(n) Report all test results, including those from invalid tests or from any nonstandard tests (such as measurements based on exhaust concentrations in parts per million).
(o) Identify the engine family's deterioration factors and describe how you developed them. Present any emission test data you used for this.
(p) Describe all adjustable operating parameters (see §1048.115(d)), including the following:
    (1) The nominal or recommended setting and the associated production tolerances.
    (2) The intended physically adjustable range.
    (3) The limits or stops used to establish adjustable ranges.
    (4) Production tolerances of the limits or stops used to establish each physically adjustable range.
    (5) Information showing that someone can't readily modify the engines to operate outside the physically

adjustable range.
(q) Describe everything we need to read and interpret all the information broadcast by an engine's onboard computers and electronic control modules and state that you will give us any hardware or tools we would need to do this. You may reference any appropriate publicly released standards that define conventions for these messages and parameters. Format your information consistent with publicly released standards.
(r) If your engine family includes a volatile liquid fuel, propose a set of design parameters and instructions for installing the engine to minimize evaporative emissions (see §1048.115(g)).
(s) State whether your engine will operate in variable-speed applications, constant-speed applications, or both. If your certification covers only constant-speed applications, describe how you will prevent use of these engines in variable-speed applications.
(t) State that all the engines in the engine family comply with the field-testing emission standards we specify in §1048.101(c) for all normal operation and use (see §1048.515). Describe in detail any testing, engineering analysis, or other information on which you base this statement.
(u) State that you operated your test engines according to the specified procedures and test parameters using the fuels described in the application to show you meet the requirements of this part.
(v) State unconditionally that all the engines in the engine family comply with the requirements of this part, other referenced parts, and the Clean Air Act.
(w) Include estimates of engine production.
(x) Add other information to help us evaluate your application if we ask for it.

§1048.210 May I get preliminary approval before I complete my application?
If you send us information before you finish the application, we will review it and make any appropriate determinations listed in §1048.215(b) within 90 days of your request. If we need to ask you for further information, we will extend the 90-day period by the number of days we wait for your response.

§1048.215 What happens after I complete my application?
(a) If any of the information in your application changes after you submit it, amend it as described in §1048.225.
(b) We may decide that we cannot approve your application unless you revise it.
(1) If you inappropriately use the provisions of §1048.230(c) or (d) to define a broader or narrower engine family, we will require you to redefine your engine family.
(2) If we determine your selected useful life for the engine family is too short, we will require you to lengthen it (see §1048.101(h)).
(3) If we determine your deterioration factors are not appropriate, we will require you to revise them (see §1048.240(c)).
(4) If your diagnostic system is inadequate for detecting significant malfunctions in emission-control systems, we will require you to make the system more effective (see §1048.110(b)).
(5) If your diagnostic system inappropriately disregards trouble codes under certain conditions, we will require you to change the system to operate under broader conditions (see §1048.110(g)).
(6) If your proposed label is inconsistent with §1048.135, we will require you to change it (and tell you how, if possible).
(7) If you require or recommend maintenance and use instructions inconsistent with §1048.125, we will require you to change them.
(8) If we find any other problem with your application, we will tell you how to correct it.
(c) If we determine your application is complete and shows you meet all the requirements, we will issue a certificate of conformity for your engine family for that model year. If we deny the application, we will explain why in writing. You may then ask us to hold a hearing to reconsider our decision (see §1048.720).

§1048.220 How do I amend the maintenance instructions in my application?
Send the Designated Officer a request to amend your application for certification for an engine family if you want to change the maintenance instructions in a way that could affect emissions. In your request, describe the proposed changes to the maintenance instructions. Unless we disapprove it, you may distribute the new maintenance instructions to your customers 30 days after we receive your request. We may also approve a shorter time or waive

this requirement.

§1048.225 How do I amend my application to include new or modified engines?

(a) You must amend your application for certification before you take either of the following actions:
(1) Add an engine to a certificate of conformity.
(2) Make a design change for a certified engine family that may affect emissions or an emission-related part over the engine's lifetime.

(b) Send the Designated Officer a request to amend the application for certification for an engine family. In your request, do all of the following:
(1) Describe the engine model or configuration you are adding or changing.
(2) Include engineering evaluations or reasons why the original test engine is or isn't still appropriate.
(3) If the original test engine for the engine family isn't appropriate to show compliance for the new or modified engine, include new test data showing that the new or modified engine meets the requirements of this part

(c) You may start producing the new or modified engine anytime after you send us your request.

(d) You must give us test data within 30 days if we ask for more testing, or stop producing the engine if you can't do this.

(e) If we determine that the certificate of conformity would not cover your new or modified engine, we will send you a written explanation of our decision. In this case, you may no longer produce these engines, though you may ask for a hearing for us to reconsider our decision (see §1048.720).

§1048.230 How do I select engine families?

(a) Divide your product line into families of engines that you expect to have similar emission characteristics. Your engine family is limited to a single model year.

(b) Group engines in the same engine family if they are identical in all of the following aspects:
(1) The combustion cycle.
(2) The cooling system (water-cooled vs. air-cooled)
(3) The number and arrangement of cylinders.
(4) The number, location, volume, and composition of catalytic converters.
(5) Method of air aspiration.
(6) Bore and stroke.
(7) Configuration of the combustion chamber.
(8) Location of intake and exhaust valves or ports.

(c) In some cases you may subdivide a group of engines that is identical under paragraph (b) of this section into different engine families. To do so, you must show you expect emission characteristics to be different during the useful life or that any of the following engine characteristics are different:
(1) Method of actuating intake and exhaust timing (poppet valve, reed valve, rotary valve, etc.).
(2) Sizes of intake and exhaust valves or ports.
(3) Type of fuel.
(4) Configuration of the fuel system.
(5) Exhaust system.

(d) If your engines are not identical with respect to the things listed in paragraph (b) of this section, but you show that their emission characteristics during the useful life will be similar, we may approve grouping them in the same engine family.

(e) If you can't define engine families by the method in this section, we will define them based on features related to emission characteristics.

§1048.235 How does testing fit with my application for a certificate of conformity?

(a) Test your engines using the procedures and equipment specified in subpart F of this part.

(b) Select from each engine family a test engine for each fuel type with a configuration you believe is most likely to exceed the emission standards. Using good engineering judgment, consider the emission levels of all exhaust constituents over the full useful life of the engine when operated in a piece of equipment.

(c) You may submit emission data for equivalent engine families from previous years instead of doing new tests, but only if the data shows that the test engine would meet all the requirements for the latest engine models. We may require you to do new emission testing if we believe the latest engine models could be substantially different from the previously tested engine.

(d) We may choose to measure emissions from any of your test engines.

(1) If we do this, you must provide the test engine at the location we select. We may decide to do the testing at your plant or any other facility. If we choose to do the testing at your plant, you must schedule it as soon as possible and make available the instruments and equipment we need.

(2) If we measure emissions on one of your test engines, the results of that testing become the official data for the engine. Unless we later invalidate this data, we may decide not to consider your data in determining if your engine family meets the emission standards.

(3) Before we test one of your engines, we may set its adjustable parameters to any point within the physically adjustable ranges (see §1048.115(d)).

(4) Calibrate the test engine within the production tolerances shown on the engine label for anything we don't consider an adjustable parameter (see §1048.205(m)).

§1048.240 How do I determine if my engine family complies with emission standards?

(a) Your engine family complies with the numerical emission standards in §1048.101 if all emission-data engines representing that family have test results showing emission levels at or below the standards in §1048.101(a) through (c).

(b) Your engine family does not comply if any emission-data engine representing that family has test results showing emission levels above the standards from §1048.101(a) through (c) for any pollutant.

(c) To compare emission levels from the test engine with the emission standards, apply deterioration factors to the measured emission levels. The deterioration factor is a number that shows the relationship between exhaust emissions at the end of useful life and at the low-hour test point. Specify the deterioration factors based on emission measurements, using three decimal places. Deterioration factors must be consistent with emission increases observed from in-use testing with similar engines (see subpart E of this part). Small-volume manufacturers may use assigned deterioration factors established by EPA. Apply the deterioration factors as follows:

(1) For engines that use aftertreatment technology, such as catalytic converters, the deterioration factor is the ratio of exhaust emissions at the end of useful life to exhaust emissions at the low-hour test point. Adjust the official emission results for each tested engine at the selected test point by multiplying the measured emissions by the deterioration factor. If the factor is less than one, use one.

(2) For engines that don't use aftertreatment technology, the deterioration factor is the difference between exhaust emissions at the end of useful life and exhaust emissions at the low-hour test point. Adjust the official emission results for each tested engine at the selected test point by adding the factor to the measured emissions. If the factor is less than zero, use zero.

(d) After adjusting the emission levels for deterioration, round them to the same number of decimal places as the standard. Compare the rounded emission levels to the emission standard for each test engine.

§1048.245 What records must I keep and make available to EPA?

(a) Organize and maintain the following records to keep them readily available; we may review these records at any time:

(1) A copy of all applications and any summary information you sent us.

(2) Any of the information we specify in §1048.205 that you did not include in your application.

(3) A detailed history of each emission-data engine. In each history, describe all of the following:

(i) The test engine's construction, including its origin and buildup, steps you took to ensure that it represents production engines, any components you built specially for it, and all emission-related components.

(ii) How you accumulated engine operating hours, including the dates and the number of hours accumulated.

(iii) All maintenance (including modifications, parts changes, and other service) and the dates and reasons

for the maintenance.

(iv) All your emission tests, including documentation on routine and standard tests, as specified in part 1065 of this chapter, and the date and purpose of each test.

(v) All tests to diagnose engine or emission-control performance, giving the date and time of each and the reasons for the test.

(vi) Any other significant events.

(b) Keep data from routine emission tests (such as test cell temperatures and relative humidity readings) for one year after we issue the associated certificate of conformity. Keep all other information specified in paragraph (a) of this section for eight years after we issue your certificate.

(c) Store these records in any format and on any media, as long as you can promptly send us organized, written records in English if we ask for them.

(d) Send us copies of any engine maintenance instructions or explanations if we ask for them.

§1048.250 When may EPA deny, revoke, or void my certificate of conformity?

(a) We may deny your application for certification if your emission-data engines fail to comply with emission standards or other requirements. Our decision may be based on any information available to us. If we deny your application, we will explain why in writing.

(b) In addition, we may deny your application or revoke your certificate if you do any of the following:

(1) Refuse to comply with any testing or reporting requirements.

(2) Submit false or incomplete information (paragraph (d) of this section applies if this is fraudulent).

(3) Render inaccurate any test data.

(4) Deny us from completing authorized activities despite our presenting a warrant or court order (see §1068.020 of this chapter).

(5) Produce engines for importation into the United States at a location where local law prohibits us from carrying out authorized activities.

(c) We may void your certificate if you don't keep the records we require or don't give us information when we ask for it.

(d) We may void your certificate if we find that you committed fraud to get it. This means intentionally submitting false or incomplete information.

(e) If we deny your application or revoke or void your certificate, you may ask for a hearing (see §1048.720). Any such hearing will be limited to substantial and factual issues.

Subpart D—Testing production-line engines

§1048.301 When must I test my production-line engines?

(a) If you produce engines that are subject the requirements of this part, you must test them as described in this subpart.

(b) We may suspend or revoke your certificate of conformity for certain engine families if your production-line engines don't meet emission standards or you don't fulfill your obligations under this subpart (see §§1048.325 and 1048.340).

(c) The requirements of this part don't affect our ability to do selective enforcement audits, as described in part 1068 of this chapter.

(d) You may ask to use an alternate program for testing production-line engines. In your request, you must show us that the alternate program gives equal assurance that your production-line engines meet the requirements of this part. If we approve your alternate program, we may waive some or all of this part's requirements.

(e) If you certify an engine family with carryover emission data, as described in §1048.235(c), and these equivalent engine families consistently meet the emission standards with production-line testing over the preceding two-year period, you may ask for a reduced testing rate for further production-line testing for that family. The minimum testing rate is one engine per engine family. If we reduce your testing rate, we may limit our approval to a single model year.

(f) We may ask you to make a reasonable number of production-line engines available for a reasonable time so we can test or inspect them for compliance with the requirements of this part.

§1048.305 How must I prepare and test my production-line engines?

(a) Test procedures. Test these engines using either the steady-state or transient testing procedures in subpart F of this part to show you meet the emission standards in §1048.101(a) or (b), respectively. We may require you to test engines using the transient testing procedures to show you meet the emission standards in §1048.101(b).

(b) Modifying a test engine. Once an engine is selected for testing (see §1048.310), you may adjust, repair, prepare, or modify it or check its emissions only if one of the following is true:

(1) You document the need for doing so in your procedures for assembling and inspecting all your production engines and make the action routine for all the engines in the engine family.

(2) This subpart otherwise specifically allows your action.

(3) We approve your action in advance.

(c) Engine malfunction. If an engine malfunction prevents further emission testing, ask us to approve your decision to either repair the engine or delete it from the test sequence.

(d) Setting adjustable parameters. Before any test, we may adjust or require you to adjust any adjustable parameter to any setting within its physically adjustable range.

(1) We may adjust idle speed outside the physically adjustable range as needed until the engine has stabilized emission levels (see paragraph (e) of this section). We may ask you for information needed to establish an alternate minimum idle speed.

(2) We may make or specify adjustments within the physically adjustable range by considering their effect on emission levels, as well as how likely it is someone will make such an adjustment with in-use engines.

(e) Stabilizing emission levels. Before you test production-line engines, you may operate the engine to stabilize the emission levels. Using good engineering judgment, operate your engines in a way that represents the way production engines will be used. You may operate each engine for no more than the greater of two periods:

(1) 50 hours.

(2) The number of hours you operated your emission-data engine for certifying the engine family (see 40 CFR part 1065, subpart E).

(f) Damage during shipment. If shipping an engine to a remote facility for production-line testing makes necessary an adjustment or repair, you must wait until after the after the initial emission test to do this work. We may waive this requirement if the test would be impossible or unsafe, or if it would permanently damage the engine. Report to us, in your written report under §1048.345, all adjustments or repairs you make on test engines before each test.

(g) Retesting after invalid tests. You may retest an engine if you determine an emission test is invalid. Explain in

your written report reasons for invalidating any test and the emission results from all tests. If you retest an engine and, within ten days after testing, ask to substitute results of the new tests for the original ones, we will answer within ten days after we receive your information.

§1048.310 How must I select engines for production-line testing?

(a) Use test results from two engines for each engine family to calculate the required sample size for the model year. Update this calculation with each test.

(b) Early in each calendar quarter, randomly select and test two engines from the end of the assembly line for each engine family.

(c) Calculate the required sample size for each engine family. Separately calculate this figure for HC+NOx and for CO. The required sample size is the greater of these two calculated values. Use the following equation:

$$N = \left[\frac{(t_{95} \times \sigma)}{(x - STD)}\right]^2 + 1$$

Where:

N = required sample size for the model year.

t_{95} = 95% confidence coefficient, which depends on the number of tests completed, n, as specified in the table in paragraph (c)(1) of this section. It defines 95% confidence intervals for a one-tail distribution.

x = mean of emission test results of the sample

STD = emission standard.

σ = test sample standard deviation (see paragraph (c)(2) of this section).

(1) Determime the 95% confidence coefficient, t_{95}, from the following table:

n	t_{95}	n	t_{95}	n	t_{95}
2	6.31	12	1.80	22	1.72
3	2.92	13	1.78	23	1.72
4	2.35	14	1.77	24	1.71
5	2.13	15	1.76	25	1.71
6	2.02	16	1.75	26	1.71
7	1.94	17	1.75	27	1.71
8	1.90	18	1.74	28	1.70
9	1.86	19	1.73	29	1.70
10	1.83	20	1.73	30	1.70
11	1.81	21	1.72	∞	1.645

(2) Calculate the standard deviation, σ, for the test sample using the following formula:

$$\sigma = \sqrt{\frac{\sum (X_i - x)^2}{n - 1}}$$

Where:

X_i = emission test result for an individual engine

n = The number of tests completed in an engine family.

(d) Use final deteriorated test results to calculate the variables in this equation (see §1048.315(a)).

(e) After each new test, recalculate the required sample size using the updated mean values, standard deviations, and the appropriate 95% confidence coefficient.

(f) Distribute the remaining engine tests evenly throughout the rest of the year. You may need to adjust your schedule for selecting engines if the required sample size changes. Continue to randomly select engines from each engine family; this may involve testing engines that operate on different fuels.

(g) Continue testing any engine family for which the sample mean, x, is greater than the emission standard. This applies if the sample mean for either HC+NOx or for CO is greater than the emission standard. Continue testing until one of the following things happens:

(1) The sample size, n, for an engine family is greater than the required sample size, N, and the sample mean, x, is less than or equal to the emission standard.

(2) The engine family doesn't comply according to §1048.325.

(3) You test 30 engines from the engine family.

(4) You test one percent of your projected annual U.S.-directed production volume for the engine family.

(5) You choose to declare that the engine family doesn't comply with emission standards.

(h) You may elect to test more randomly chosen engines than we require. Include these engines in the sample size calculations.

§1048.315 How do I know when my engine family doesn't comply?

(a) Calculate your test results. Round them to the number of decimal places in the emission standard expressed to one more decimal place.

(1) Initial and final test results. Calculate and round the test results for each engine. If you do several tests on an engine, calculate the initial test results, then add them together and divide by the number of tests and round for the final test results on that engine.

(2) Final deteriorated test results. Apply the deterioration factor for the engine family to the final test results (see §1048.240(c)).

(b) Construct the following CumSum Equation for each engine family (for HC+NOx and for CO emissions):

$$C_i = C_{i-1} + X_i - (STD + F)$$

Where:

C_i = The current CumSum statistic.

C_{i-1} = The previous CumSum statistic. Prior to any testing, the CumSum statistic is 0 (i.e. $C_0 = 0$).

X_i = The current emission test result for an individual engine.

STD = Emission standard.

F = $0.25 \times \sigma$.

(c) Use final deteriorated test results to calculate the variables in this equation (see §1048.315(a)).

(d) After each new test, recalculate the CumSum statistic.

(e) If you test more than the required number of engines, include the results from these additional tests in the CumSum Equation.

(f) After each test, compare the current CumSum statistic, C_i, to the recalculated Action Limit, H, defined as $H = 5.0 \times \sigma$.

(g) If the CumSum statistic exceeds the Action Limit in two consecutive tests, the engine family doesn't comply

with the requirements of this part. Tell us within ten working days if this happens.
(h) If you amend the application for certification for an engine family (see §1048.225), don't change any previous calculations of sample size or CumSum statistics for the model year.

§1048.320 What happens if one of my production-line engines fails to meet emission standards?
(a) If you have a production-line engine with final deteriorated test results exceeding one or more emission standards (see §1048.315(a)), the certificate of conformity is automatically suspended for that failing engine. You must take the following actions before your certificate of conformity can cover that engine:
(1) Correct the problem and retest the engine to show it complies with all emission standards.
(2) Include in your written report a description of the test results and the remedy for each engine (see §1048.345).
(b) You may at any time ask for a hearing to determine whether the tests and sampling methods were proper (see §1048.720).

§1048.325 What happens if an engine family doesn't comply?
(a) We may suspend your certificate of conformity for an engine family if it fails to comply under §1048.315. The suspension may apply to all facilities producing engines from an engine family, even if you find noncompliant engines only at one facility.
(b) We will tell you in writing if we suspend your certificate in whole or in part. We will not suspend a certificate until at least 15 days after the engine family became noncompliant. The suspension is effective when you receive our notice.
(c) Up to 15 days after we suspend the certificate for an engine family, you may ask for a hearing to determine whether the tests and sampling methods were proper (see §1048.720). If we agree before a hearing that we used erroneous information in deciding to suspend the certificate, we will reinstate the certificate.

§1048.330 May I sell engines from an engine family with a suspended certificate of conformity?
You may sell engines that you produce after we suspend the engine family's certificate of conformity under §1048.315 only if one of the following occurs:
(a) You test each engine you produce and show it complies with emission standards that apply.
(b) We conditionally reinstate the certificate for the engine family. We may do so if you agree to recall all the affected engines and remedy any noncompliance at no expense to the owner if later testing shows that the engine family still does not comply.

§1048.335 How do I ask EPA to reinstate my suspended certificate?
(a) Send us a written report in which you identify the reason for noncompliance, propose a remedy, and commit to a date for carrying it out. In your proposed remedy include any quality control measures you propose to keep the problem from happening again.
(b) Give us data from production-line testing that shows the remedied engine family complies with all the emission standards that apply.

§1048.340 When may EPA revoke my certificate under this subpart and how may I sell these engines again?
(a) We may revoke your certificate for an engine family in the following cases:
(1) You don't meet the reporting requirements.
(2) Your engine family fails to meet emission standards and your proposed remedy to address a suspended certificate under §1048.325 is inadequate to solve the problem or requires you to change the engine's design or emission-control system.
(b) To sell engines from an engine family with a revoked certificate of conformity, you must modify the engine family and then show it complies with the requirements of this part.
(1) If we determine your proposed design change may not control emissions for the engine's full useful life, we will tell you within five working days after receiving your report. In this case we will decide whether production-line testing will be enough for us to evaluate the change or whether you need to do more testing.
(2) Unless we require more testing, you may show compliance by testing production-line engines as described

in this subpart.

(3) We will issue a new or updated certificate of conformity when you have met these requirements.

§1048.345 What production-line testing records must I send to EPA?

(a) Within 30 calendar days of the end of each calendar quarter, send us a report with the following information:

(1) Describe any facility used to test production-line engines and state its location.

(2) State the total U.S.-directed production volume and number of tests for each engine family.

(3) Describe how you randomly selected engines.

(4) Describe your test engines, including the engine family's identification and the engine's model year, build date, model number, identification number, and number of hours of operation before testing for each test engine.

(5) Identify where you accumulated hours of operation on the engines and describe the procedure and schedule you used.

(6) Provide the test number; the date, time and duration of testing; test procedure; initial test results before and after rounding; final test results; and final deteriorated test results for all tests. Provide the emission results for all measured pollutants. Include information for both valid and invalid tests and the reason for any invalidation.

(7) Describe completely and justify any nonroutine adjustment, modification, repair, preparation, maintenance, or test for the test engine if you did not report it separately under this subpart. Include the results of any emission measurements, regardless of the procedure or type of equipment.

(8) Provide the CumSum analysis required in §1048.315 for each engine family.

(9) Report on each failed engine as described in §1048.320.

(10) State the date the calendar quarter ended for each engine family.

(b) We may ask you to add information to your written report, so we can determine whether your new engines conform with the requirements of this subpart.

(c) An authorized representative of your company must sign the following statement:

"We submit this report under Sections 208 and 213 of the Clean Air Act. Our production-line testing conformed completely with the requirements of 40 CFR part 1048. We have not changed production processes or quality-control procedures for the engine family in a way that might affect the emission control from production engines. All the information in this report is true and accurate, to the best of my knowledge. I know of the penalties for violating the Clean Air Act and the regulations." (Authorized Company Representative)

(d) Send electronic reports of production-line testing to the Designated Officer using an approved information format. If you want to use a different format, send us a written request with justification for a waiver.

(e) We will send copies of your reports to anyone from the public who asks for them. We won't release information about your sales or production volumes, which we will consider confidential under 40 CFR part 2.

§1048.350 What records must I keep?

(a) Organize and maintain your records as described in this section. We may review your records at any time, so it's important to keep required information readily available.

(b) Keep paper records of your production-line testing for one full year after you complete all the testing required for an engine family in a model year. You may use any additional storage formats or media if you like.

(c) Keep a copy of the written reports described in §1048.345.

(d) Keep the following additional records:

(1) A description of all test equipment for each test cell that you can use to test production-line engines.

(2) The names of supervisors involved in each test.

(3) The name of anyone who authorizes adjusting, repairing, preparing, or modifying a test engine and the names of all supervisors who oversee this work.

(4) If you shipped the engine for testing, the date you shipped it, the associated storage or port facility, and the date the engine arrived at the testing facility.

(5) Any records related to your production-line tests that are not in the written report.

(6) A brief description of any significant events during testing not otherwise described in the written report or in this section.

(e) If we ask, you must give us projected or actual production figures for an engine family. We may ask you to

divide your production figures by power rating, displacement, fuel type, or assembly plant (if you produce engines at more than one plant).
(f) Keep a list of engine identification numbers for all the engines you produce under each certificate of conformity. Give us this list within 30 days if we ask for it.
(g) We may ask you to keep or send other information necessary to implement this subpart.

Subpart E—Testing in-use engines

§1048.401 What testing requirements apply to my engines that have gone into service?

(a) If you produce engines that are subject to the requirements of this part, you must test them as described in this subpart. This generally involves testing engines in the field or removing them for measurement in a laboratory.

(b) We may suspend or revoke your certificate of conformity for an engine family if in-use testing shows that the family fails to meet emission standards (see §1048.420) or if you don't meet your obligations under this part. You may use averaging, banking, or trading of in-use emission credits to show that an engine family meets the standards (see §1048.415).

(c) We may approve an alternate plan for showing that in-use engines comply with the requirements of this part if one of the following is true:

(1) You produce 200 or fewer engines per year in the selected engine family.

(2) Removing the engine from most of the applications for that engine family causes significant, irreparable damage to the equipment.

(3) You identify a unique aspect of your engine applications that keeps you from doing the required in-use testing.

(d) Independent of your responsibility to test in-use engines, we may choose at any time to do our own testing of your in-use engines.

§1048.405 How does this program work?

(a) You must test in-use engines from the families we select. We may select up to 25 percent of your engine families in any model year—or one engine family if you have three or fewer families. We will select engine families for testing before the end of the model year. When we select an engine family for testing, we may specify that you preferentially test engines based on fuel type or equipment type. In addition, we may identify specific modes of operation or sampling times.

(b) You may choose to test additional engine families that we don't select. You must explain to us your rationale and propose a testing plan if you want to generate in-use emission credits from this testing (see §1048.415). You may begin testing these engines 30 days after you propose your testing plan or after we approve it, whichever comes first.

(c) Send us an in-use testing plan within 12 calendar months after we direct you to test a particular engine family. Complete the testing within 24 calendar months after we approve your plan.

(d) You may need to test engines from more than one model year at a given time.

§1048.410 How must I select, prepare, and test my in-use engines?

(a) You may make arrangements to select representative test engines from your own fleet or from other independent sources.

(b) For the selected engine families, select engines that you or your customers have–

(1) operated for at least 50 percent of the engine family's useful life (see §1048.101(d));

(2) not maintained or used in an abnormal way, and

(3) documented in terms of total hours of operation, maintenance, operating conditions, and storage.

(c) Use the following methods to determine the number of engines you must test in each engine family:

(1) Test at least two engines if you produce 2,000 or fewer engines in the model year from all engine families, or if you produce 500 or fewer engines from the selected engine family. Otherwise, test at least four engines.

(2) If you successfully complete an in-use test program on an engine family and later certify an equivalent engine family with carryover emission data, as described in §1048.235(c), then test at least one engine instead of the testing rates in paragraph (c)(1) of this section.

(3) If you test the minimum required number of engines and all comply fully with emission standards, you may stop testing.

(4) For each engine that fails any applicable standard, test two more. Regardless of measured emission levels, you don't have to test more than ten engines in an engine family. You may do more tests than we require.

(5) You may concede that the engine family doesn't comply before testing a total of ten engines.

(d) You may do minimal maintenance to set components of a test engine to specifications for anything we don't consider an adjustable parameter (see §1048.205(m)). Limit maintenance to what is in the owner's instructions for engines with that amount of service and age. Document all maintenance and adjustments.
(e) Do at least one valid emission test for each test engine.
(f) For a test program on an engine family, choose one of the following methods to test your engines:
(1) Remove the selected engines for testing in a laboratory. Use the applicable steady-state and transient procedures in subpart F of this part to show compliance with the duty-cycle standards in §1048.101(a) and (b). We may direct you to measure emissions on the dynamometer using the supplemental test procedures in §1048.515 to show compliance with the field-testing standards in §1048.101(c).
(2) Test the selected engines while they remain installed in the equipment. Use the field testing procedures in subpart F of this part. Measure emissions during normal operation of the equipment to show compliance with the field-testing standards in §1048.101(c). We may direct you to include specific areas of normal operation.
(g) You may ask us to waive parts of the prescribed test procedures if they are not necessary to determine in-use compliance.
(h) Calculate the average emission levels for an engine family from the results for the set of tested engines. Round them to the number of decimal places in the emission standards expressed to one more decimal place.

§1048.415 How can I use in-use emission credits?
(a) You may include all engines subject to this part in the voluntary in-use credit program; however, you may generate or use emission credits under this program only if you measure emissions using the transient duty-cycle procedures in Subpart F of this part.
(b) If your average emission level for a family is lower than the emission standard, you may generate positive emission credits for any of three purposes:
(1) Averaging. Use these emission credits for averaging in the same model year. If you want to test other engine families to generate additional credits, file your request and plan with us for approval (See §1048.405).
(2) Banking. Reserve a positive balance of unused credits at the end of the model year for banking and then "withdraw" them for a later model year.
(3) Trading. Sell your banked credits to another manufacturer or a broker for engines that are also subject to the requirements of this part. A manufacturer may use purchased credits for averaging, banking, or further trading.
(c) You may use emission credits for banking or trading beginning 30 days after you submit the last report required for a model year. We may correct any errors in calculating banked credits, but we may revoke some or all in-use emission credits if we discover problems or errors in calculating or reporting them.
(d) If your average emission level for a family is higher than the emission standard, you must calculate the negative or required credits for that engine family and use positive emission credits to offset them. You have until the date of the last report required for a model year to complete credit exchanges, so you can show a zero or positive credit balance.
(e) You may not generate positive emission credits for an engine family if it has an average emission level higher than the emission standard for any other pollutant.
(f) In-use emission credits expire after three model years. For example, emission credits you generate with 2007 model year engines are available for showing compliance with 2010 model year engines, but not with 2011 model year engines.
(g) For in-use emission credit trading that results in a negative credit balance, both the buyer and seller are liable, except in cases involving fraud. If a credit buyer is not responsible for causing the negative credit balance, the buyer is only liable to supply additional credits equivalent to any amount of invalid credits involved. If your engine families are involved in a negative trade, we order you to recall those engines.
(h) Calculate positive and negative emission credits according to the following equation and round the results to the nearest metric ton:

$$CREDITS = SALES \times (STD - CL) \times POWER \times AF \times LF \times UL \times 10^{-6}$$

Where,

CREDITS = emission credits in metric tons.
SALES = the number of eligible sales, tracked to the point of first retail sale in the U.S., for the given engine family during the model year.
STD = the emission standard in g/kW-hr.
CL = average emission level for an in-use testing family in g/kW-hr.
UL= useful life in hours (see §1048.101(d)).
Power = the sales-weighted average rated power for an engine family in kW.
LF = load factor or fraction of rated engine power utilized in use; use 0.50 for constant-speed engines and 0.32 for all other engines.
AF = adjustment factor for the number of tests you do, as shown in the following table; this factor is 1.0 if the engine family has an average emission level higher than the emission standard for any pollutant.

Table 1 of §1048.415
Adjustment Factors for In-use Credit Calculation

Number of Engines Tested	Adjustment Factor for Positive Credits
2	0.45
3	0.45
4	0.45
5	0.56
6	0.68
7	0.74
8	0.81
9	0.86
10+	0.90

§1048.420 What happens if my in-use engines don't meet requirements?
(a) Determine the reason each in-use engine exceeds the emission standards.
(b) If the average emission levels calculated in 1048.410(h) exceed any of the emission standards that apply, the engine family is noncompliant. Section 1048.415 describes how you can use in-use averaging, banking, or trading to show that your engine families comply with the standards. Determine the reasons any engine family doesn't comply and notify us within fifteen days of completing testing on this family.
(c) If you voluntarily test more engine families and these engines don't comply with emission standards, you must treat the family as though it failed under the in-use testing program we direct.
(d) You may voluntarily recall an engine family for emission failures, as described in §1068.535 of this chapter, unless we have ordered a recall for that family under §1068.505 of this chapter.
(e) We will consider failure rates, average emission levels, and any defects— among other things— to decide on taking remedial action under this subpart. We may order a recall before or after you complete testing of an engine family if we determine a substantial number of engines don't conform to section 213 of the Act or to this part.
(f) You have the right to a hearing before we suspend or revoke your engine family's certificate of conformity (see §1048.720).

§1048.425 What in-use testing information must I report to EPA?

(a) In a report to us within three months after you finish testing an engine family, do all the following:
(1) Identify the engine family, model, serial number, and date of manufacture.
(2) For each engine inspected or considered for testing, identify whether the diagnostic system was functioning.
(3) Describe the specific reasons for disqualifying any engines for not being properly maintained or used.
(4) For each engine selected for testing, include the following information:
(i) Estimate the hours each engine was used before testing.
(ii) Describe all maintenance, adjustments, modifications, and repairs to each test engine.
(5) State the date and time of each test attempt.
(6) Include the results of all emission testing, including incomplete or invalidated tests, if any.

(b) Notify us separately of any engine families that don't meet emission standards, as described in §1048.420.

(c) If you participate in the in-use credit program, send us a report within 90 days after completing all in-use testing for the model year. If we don't receive this report on time, we will treat the results of your in-use testing without considering credits. Include required information in your report and show the calculated credits from all your in-use testing for the model year.

(d) If you or we determine a previous report had errors, you must recalculate your credits. We will void any erroneous positive credits and may adjust any erroneous negative credits. Don't recalculate your credits when you update your sales information for in-use testing, unless you made an error in estimating the number of engines you export.

(e) Send electronic reports of in-use testing to the Designated Officer using an approved information format. If you want to use a different format, send us a written request with justification for a waiver.

(f) We will send copies of your reports to anyone from the public who asks for them. We won't release information about your sales or production volumes, which is all we will consider confidential.

(g) We may ask for more information.

§1048.430 What records must I keep?

(a) Organize and maintain your records as described in this section. We may review your records at any time, so it's important to keep required information readily available.

(b) Keep paper records of your in-use testing for one full year after you complete all the testing required for an engine family in a model year. You may use any additional storage formats or media if you like.

(c) Keep a copy of the written reports described in §1048.425.

(d) Keep the following additional records:
(1) Documents used in the procurement process.
(2) Required records for the in-use credit program described in §1048.415 if you participate in it.

Subpart F—Test procedures

§1048.501 What procedures must I use to test my engines?

(a) Use the equipment and procedures for spark-ignition engines in part 1065 of this chapter to show your engines meet the duty-cycle emission standards in §1048.101(a) and (b). Measure HC, NOx, CO, and CO_2 emissions using the dilute sampling procedures in part 1065 of this chapter. Use the applicable duty cycles in §§1048.505 and 1048.510.

(b) We describe in §1048.515 the supplemental procedures for showing that your engines meet the field-testing emission standards in §1048.101(c).

(c) Use the fuels specified in 40 CFR part 1065, subpart C for all the testing and service accumulation we require in this part.

(d) You may use special or alternate procedures, as described in §1065.010 of this chapter.

(e) We may reject data you generate using alternate procedures if later testing with the procedures in part 1065 of this chapter shows contradictory emission data.

§1048.505 What steady-state duty cycles apply for laboratory testing?

(a) Measure emissions by testing the engine on a dynamometer with one or both of the following sets of steady-state duty cycles:

(1) Use the 5-mode duty cycle described in Table 1 of this section if you certify an engine family for operation only at a single, rated speed.

(2) Use the 7-mode duty cycle described in Table 2 of this section for engines from an engine family that will be used only in variable-speed applications.

(3) Use both of the duty cycles described in paragraphs (a)(1) and (a)(2) of this section if you won't restrict an engine family to constant-speed or variable-speed applications.

(b) If we test an engine to confirm that it meets the duty-cycle emission standards, we will use the duty cycles that apply for that engine family.

(c) During idle mode, operate the engine with the following parameters:

(1) Hold the speed within your specifications.

(2) Keep the throttle fully closed.

(3) Keep engine torque under 5 percent of the peak torque value at maximum test speed.

(d) For the full-load operating mode, operate the engine at its maximum fueling rate.

(e) See part 1065 of this chapter for detailed specifications of tolerances and calculations.

Table 1 of §1048.505—5-Mode Duty Cycle for Constant-Speed Engines[1]

Mode Number	Engine Speed	Torque	Minimum Time in mode (minutes)	Weighting Factors
1	Maximum test speed	100	5.0	0.05
2	Maximum test speed	75	5.0	0.25
3	Maximum test speed	50	5.0	0.30
4	Maximum test speed	25	5.0	0.30
5	Maximum test speed	10	5.0	0.10

[1]This duty cycle is analogous to the D2 cycle specified in ISO 8178–4.

Table 2 of §1048.505—7-Mode Duty Cycle[1]

Mode Number	Engine Speed	Observed Torque[2]	Minimum Time in mode (minutes)	Weighting Factors
1	Maximum test speed	25	5.0	0.06
2	Intermediate test speed	100	5.0	0.02
3	Intermediate test speed	75	5.0	0.05
4	Intermediate test speed	50	5.0	0.32
5	Intermediate test speed	25	5.0	0.30
6	Intermediate test speed	10	5.0	0.10
7	Idle	0	5.0	0.15

[1]This duty cycle is analogous to the C2 cycle specified in ISO 8178–4.
[2]The percent torque is relative to the maximum torque at the given engine speed.

§1048.510 What transient duty cycles apply for laboratory testing?

(a) Starting with the 2007 model year, measure emissions by testing the engine on a dynamometer with one of the following transient duty cycles:

(1) If you certify an engine family for constant-speed operation only, use the transient duty-cycle described in Appendix I of this part.

(2) For all other engines, use the transient duty-cycle described in Appendix II of this part.

(b) If we test an engine to confirm that it meets the duty-cycle emission standards, we will use the duty cycle that applies for that engine family.

(c) To warm up the engine, operate it for the first 180 seconds of the appropriate duty cycle, then allow it to idle without load for 30 seconds. At the end of the 30-second idling period, start measuring emissions as the engine operates over the prescribed duty cycle.

§1048.515 Field-testing procedures.

(a) This section describes the procedures to show that your engines meet the field-testing emission standards in §1048.101(c). These procedures may include any normal engine operation and ambient conditions that the engines may experience in use. Paragraph (c) of this section defines the limits of what we will consider normal engine operation and ambient conditions. Measure emissions with one of the following procedures.

(1) Remove the selected engines for testing in a laboratory. This generally involves the same equipment and sampling methods we specify in §1048.501(a). You can use the engine dynamometer to simulate normal operation, as described in this section.

(2) Test the selected engines while they remain installed in the equipment. Part 1065, subpart J describes the equipment and sampling methods for testing engines in the field. Use fuel meeting the specifications of 40 CFR 1065.210 or a fuel typical of what you would expect the engine to use in service.

(b) Use the test procedures we specify in §1048.501, except for the provisions we specify in this section.

(c) To comply with the emission standards in §1048.101(c), an engine's emissions may not exceed the levels we specify in §1048.101(c) for any continuous sampling period of at least 120 seconds under the following ranges of operation and operating conditions:

(1) Engine operation during the emission sampling period may include any normal operation, subject to the following restrictions:

(i) Average power must be over 5 percent of rated power.

(ii) Continuous time at idle must not be greater than 120 seconds.

(iii) The sampling period may not begin until the engine has reached stable operating temperatures. For

example, this would exclude engine operation after starting until the thermostat starts modulating coolant temperature.

(iv) The sampling period may not include engine starting.

(v) For gasoline-fueled engines, operation at 90 percent or more of maximum power must be less than 10 percent of the total sampling time. You may request our approval for a different power threshold.

(2) Engine testing may occur under any normal conditions without correcting measured emission levels, subject to the following restrictions:

(i) Barometric pressure must be between 600 and 775 mm Hg.

(ii) Ambient air temperature must be between 13° and 35° C.

Subpart G—Compliance provisions

§1048.601 What compliance provisions apply to these engines?
Engine and equipment manufacturers, as well as owners, operators, and rebuilders of these engines, and all other persons, must observe the requirements and prohibitions in part 1068 of this chapter. The compliance provisions in this subpart apply only to the engines we regulate in this part.

§1048.605 What are the provisions for exempting engines from the requirements of this part if they are already certified under the motor-vehicle program?
(a) This section applies to you if you are an engine manufacturer. See §1048.610 if you are not an engine manufacturer.
(b) The only requirements or prohibitions from this part that apply to an engine that is exempt under this section are in this section.
(c) If you meet all the following criteria regarding your new engine, it is exempt under this section:
(1) You must produce it by modifying an engine covered by a valid certificate of conformity under 40 CFR part 86.
(2) You must not make any changes to the certified engine that we could reasonably expect to increase its exhaust or evaporative emissions. For example, if you make any of the following changes to one of these engines, you do not qualify for this exemption:
(i) Change any fuel system or evaporative system parameters from the certified configuration (this does not apply to refueling emission controls).
(ii) Change any other emission-related components.
(iii) Modify or design the engine cooling system so that temperatures or heat rejection rates are outside the original engine manufacturer's specified ranges.
(3) You must make sure the engine still has the label we require under 40 CFR part 86.
(4) You must make sure that fewer than 50 percent of the engine model's total sales, from all companies, are used in nonroad applications..
(d) If you produce both the engine and vehicle under this exemption, you must do all of the following to keep the exemption valid:
(1) Make sure the original engine label is intact.
(2) Add a permanent supplemental label to the engine in a position where it will remain clearly visible after installation in the equipment. In your engine label, do the following:
(i) Include the heading: "Nonroad Engine Emission Control Information".
(ii) Include your full corporate name and trademark.
(iii) State: "THIS ENGINE WAS ADAPTED FOR NONROAD USE WITHOUT AFFECTING ITS EMISSION CONTROLS."
(iv) State the date you finished modifying the engine (month and year).
(3) Make sure the original and supplemental labels are readily visible after the engine is installed in the equipment or, if equipment obscures the engine's labels, make sure the equipment manufacturer attaches duplicate labels, as described in §1068.105 of this chapter.
(4) Send the Designated Officer a signed letter by the end of each calendar year (or less often if we tell you) with all the following information:
(i) Identify your full corporate name, address, and telephone number.
(ii) List the engine models you expect to produce under this exemption in the coming year.
(iii) State: "We produce each listed engine model for nonroad application without making any changes that could increase its certified emission levels, as described in 40 CFR 1048.605."
(e) If your engines do not meet the criteria listed in paragraph (c) of this section, they will be subject to the standards and prohibitions of this part. Producing these engines without a valid exemption or certificate of conformity would violate the prohibitions in §1068.101 of this chapter.
(f) If you are the original manufacturer of both the highway and nonroad versions of an exempted engine, you must send us emission test data on the applicable nonroad duty cycle(s) (see §§1048.505 and 1048.510). You may

include the data in your application for certification or in your letter requesting the exemption.
(g) If you are the original manufacturer of an exempted engine that is modified by another company under this exemption, we may require you to send us emission test data on the applicable nonroad duty cycle(s). If we ask for this data, we will allow a reasonable amount of time to collect it.
(h) Make sure the engine exempted under this section meets all applicable requirements from 40 CFR part 86. This applies to engine manufacturers, equipment manufacturers who use these engines, and all other persons as if these engines were used in a motor vehicle.

§1048.610 What are the provisions for producing nonroad equipment with engines already certified under the motor-vehicle program?
If you are not an engine manufacturer, you may produce nonroad equipment from complete or incomplete motor vehicles with the motor vehicle engine if you meet three criteria:
(a) The engine or vehicle is certified to 40 CFR part 86.
(b) The engine is not adjusted outside the manufacturer's specifications.
(c) The engine or vehicle is not modified in any way that may affect its emission control. This applies to exhaust and evaporative emission controls, but not refueling emission controls.

§1048.615 What are the provisions for exempting engines designed for lawn and garden applications?
This section is intended for engines designed for lawn and garden applications, but it applies to any engines meeting the size criteria in paragraph (a) of this section.
(a) If an engine meets all the following criteria, it is exempt from the requirements of this part:
(1) The engine must have a total displacement of 1,000 cc or less.
(2) The engine must have a rated power at or below 30 kW.
(3) The engine must be in an engine family that has a valid certificate of conformity showing that it meets emission standards for Class II engines under 40 CFR part 90.
(b) The only requirements or prohibitions from this part that apply to an engine that is exempt under this section are in this section.
(c) If your engines don't meet the criteria listed in paragraph (a) of this section, they will be subject to the provisions of this part. Producing these engines without a valid exemption or certificate of conformity would violate the prohibitions in §1068.101 of this chapter.
(d) Engines exempted under this section are subject to all the requirements affecting engines under 40 CFR part 90. The requirements and restrictions of 40 CFR part 90 apply to anyone manufacturing these engines, anyone manufacturing equipment that uses these engines, and all other persons in the same manner as if these engines had a total rated power at or below 19 kW.

Subpart H—Definitions and Other Reference Information

§1048.701 What definitions apply to this part?

The following definitions apply to this part. The definitions apply to all subparts unless we note otherwise. All undefined terms have the meaning the Act gives to them.

Act means the Clean Air Act, as amended, 42 U.S.C. 7401 et.seq.

Adjustable parameter means any device, system, or element of design that someone can adjust (including those which are difficult to access) and that, if adjusted, may affect emissions or engine performance during emission testing or normal in-use operation.

Aftertreatment means relating to any system, component, or technology mounted downstream of the exhaust valve or exhaust port whose design function is to reduce exhaust emissions.

Aircraft means any vehicle capable of sustained air travel above treetop heights.

All-terrain vehicle means a nonroad vehicle with three or more wheels and a seat, designed for operation over rough terrain and intended primarily for transportation. This includes both land-based and amphibious vehicles.

Auxiliary emission-control device means any element of design that senses temperature, engine rpm, motive speed, transmission gear, atmospheric pressure, manifold pressure or vacuum, or any other parameter to activate, modulate, delay, or deactivate the operation of any part of the emission-control system. This also includes any other feature that causes in-use emissions to be higher than those measured under test conditions, except as we allow under this part.

Auxiliary marine engine means a marine engine not used for propulsion.

Blue Sky Series engine means an engine meeting the requirements of §1048.140.

Broker means any entity that facilitates a trade of emission credits between a buyer and seller.

Calibration means the set of specifications and tolerances specific to a particular design, version, or application of a component or assembly capable of functionally describing its operation over its working range.

Certification means obtaining a certificate of conformity for an engine family that complies with the emission standards and requirements in this part.

Compression-ignition means relating to a type of reciprocating, internal-combustion engine that is not a spark-ignition engine.

Constant-speed engine means an engine governed to operate at a single speed.

Crankcase emissions means airborne substances emitted to the atmosphere from any part of the engine crankcase's ventilation or lubrication systems. The crankcase is the housing for the crankshaft and other related internal parts.

Designated Officer means the Manager, Engine Programs Group (6403-J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., Washington, DC 20460.

Emission-control system means any device, system, or element of design that controls or reduces the regulated emissions from an engine.

Emission-data engine means an engine that is tested for certification.

Emission-related maintenance means maintenance that substantially affects emissions or is likely to substantially affect emissions deterioration.

Engine family means a group of engines with similar emission characteristics, as specified in §1048.230.

Engine manufacturer has the meaning given in section 216(1) of the Act. In general, this term includes any person who manufactures an engine for sale in the United States or otherwise introduces a new engine into commerce in the United States. This includes importers.

Good engineering judgment has the meaning we give it in §1068.005 of this chapter.

Fuel system means all components involved in transporting, metering, and mixing the fuel from the fuel tank to the combustion chamber(s), including the fuel tank, fuel tank cap, fuel pump, fuel filters, fuel lines, carburetor or fuel-injection components, and all fuel-system vents.

High-cost warranted part means a component covered by the emission-related warranty with a replacement cost (at the time of certification) exceeding $400 (in 1998 dollars). Adjust this value using the most recent annual average consumer price index information published by the U.S. Bureau of Labor Statistics. For this definition, replacement cost includes the retail cost of the part plus labor and standard diagnosis.

Hydrocarbon (HC) means the hydrocarbon group on which the emission standards are based for each fuel type. For gasoline- and LPG-fueled engines, HC means total hydrocarbon (THC). For natural gas-fueled engines, HC means nonmethane hydrocarbon (NMHC). For alcohol-fueled engines, HC means total hydrocarbon equivalent (THCE).

Identification number means a unique specification (for example, model number/serial number combination) that allows someone to distinguish a particular engine from other similar engines.

Intermediate test speed has the meaning we give in §1065.515.

Marine engine means an engine that someone installs or intends to install on a marine vessel.

Marine vessel means a vehicle that is capable of operation in water but is not capable of operation out of water. Amphibious vehicles are not marine vessels.

Maximum test torque has the meaning we give in §1065.1000.

Maximum test speed has the meaning we give in §1065.515.

Model year means one of the following things:

(1) For freshly manufactured engines (see definition of "new nonroad engine," paragraph (1)), model year means one of the following:

(i) Calendar year.

(ii) Your annual new model production period if it is different than the calendar year. This must include January 1 of the calendar year for which the model year is named. It may not begin before January 2 of the previous calendar year and it must end by December 31 of the named calendar year.

(2) For an engine that is converted to a nonroad engine after being placed into service in a motor vehicle, model year means the calendar year in which the engine was originally produced (see definition of "new nonroad engine," paragraph (2)).

(3) For a nonroad engine excluded under §1048.005 that is later converted to operate in an application that is not excluded, model year means the calendar year in which the engine was originally produced (see definition of "new nonroad engine," paragraph (3)).

(4) For engines that are not freshly manufactured but are installed in new nonroad equipment, model year means the calendar year in which the engine is installed in the new nonroad equipment (see definition of "new nonroad engine," paragraph (4)).

(5) For an engine modified by an importer (not the original engine manufacturer) who has a certificate of conformity for the imported engine (see definition of "new nonroad engine," paragraph (5)), model year means one of the following:

(i) The calendar year in which the importer finishes modifying and labeling the engine.

(ii) Your annual production period for producing engines if it is different than the calendar year; follow the guidelines in paragraph (1)(ii) of this definition.

(6) For an engine you import that doesn't meet the criteria in paragraphs (1) through (5) of the definition of "new nonroad engine," model year means the calendar year in which the manufacturer completed the original assembly of the engine. In general, this applies to used equipment that you import without conversion or major modification.

Motor vehicle has the meaning we give in §85.1703(a) of this chapter. In general, motor vehicle means a self-propelled vehicle that can transport one or more people or any material, but doesn't include any of the following:

(1) Vehicles having a maximum ground speed over level, paved surfaces no higher than 40 km per hour (25 miles per hour).

(2) Vehicles that lack features usually needed for safe, practical use on streets or highways— for example, safety features required by law, a reverse gear (except for motorcycles), or a differential.

(3) Vehicles whose operation on streets or highways would be unsafe, impractical, or highly unlikely. Examples are vehicles with tracks instead of wheels, very large size, or features associated with military vehicles, such as armor or weaponry.

New nonroad engine means any of the following things:

(1) A freshly manufactured nonroad engine for which the ultimate buyer has never received the equitable or legal title. The engine is no longer new when the ultimate buyer receives this title or the product is placed into service, whichever comes first.

(2) An engine originally manufactured as a motor vehicle engine that is later intended to be used in a piece of

nonroad equipment. The engine is no longer new when it is placed into nonroad service.
(3) A nonroad engine that has been previously placed into service in an application we exclude under §1048.005, where that engine is installed in a piece of equipment for which these exclusions don't apply. The engine is no longer new when it is placed into nonroad service.
(4) An engine not covered by paragraphs (1) through (3) of this definition that is intended to be installed in new nonroad equipment. The engine is no longer new when the ultimate buyer receives a title for the equipment or the product is placed into service, whichever comes first.
(5) An imported nonroad engine covered by a certificate of conformity issued under this part, where someone other than the original manufacturer modifies the engine after its initial assembly and holds the certificate. The engine is no longer new when it is placed into nonroad service.
(6) An imported nonroad engine that is not covered by a certificate of conformity issued under this part at the time of importation.

New nonroad equipment means either of the following things:
(1) A nonroad vehicle or other piece of equipment for which the ultimate buyer has never received the equitable or legal title. The product is no longer new when the ultimate buyer receives this title or the product is placed into service, whichever comes first.
(2) An imported nonroad piece of equipment with an engine not covered by a certificate of conformity issued under this part at the time of importation and manufactured after the date for applying the requirements of this part.

Noncompliant engine means an engine that was originally covered by a certificate of conformity, but is not in the certified configuration or otherwise does not comply with the conditions of the certificate.

Nonconforming engine means an engine not covered by a certificate of conformity that would otherwise be subject to emission standards.

Nonmethane hydrocarbon means the difference between the emitted mass of total hydrocarbons and the emitted mass of methane.

Nonroad means relating to nonroad engines.

Nonroad engine has the meaning given in §1068.025 of this chapter. In general this means all internal-combustion engines except motor vehicle engines, stationary engines, or engines used solely for competition. This part does not apply to all nonroad engines (see §1048.005).

Off-highway motorcycle means a two-wheeled vehicle with a nonroad engine and a seat (excluding marine vessels and aircraft). Note: highway motorcycles are regulated under 40 CFR part 86.

Oxides of nitrogen means nitric oxide (NO) and nitrogen dioxide (NO_2). Oxides of nitrogen are expressed quantitatively as if the NO were in the form of NO_2 (assume a molecular weight for oxides of nitrogen equivalent to that of NO_2).

Placed into service means used for its intended purpose.

Propulsion marine engine means a marine engine that moves a vessel through the water or directs the vessel's movement.

Rated power means the maximum power an engine produces at maximum test speed.

Revoke means to discontinue the certificate for an engine family. If we revoke a certificate, you must apply for a new certificate before continuing to produce the affected vehicles or engines. This does not apply to vehicles or engines you no longer possess.

Round means to round numbers according to ASTM E29-93a, which is incorporated by reference (see §1048.710), unless otherwise specified.

Scheduled maintenance means adjusting, repairing, removing, disassembling, cleaning, or replacing components or systems that is periodically needed to keep a part from failing or malfunctioning. It also may mean actions you expect are necessary to correct an overt indication of failure or malfunction for which periodic maintenance is not appropriate.

Snowmobile means a vehicle designed to operate outdoors only over snow-covered ground, with a maximum width of 1.5 meters or less.

Spark-ignition means relating to a 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.

Stationary engine means an internal combustion engine that is neither a nonroad engine, nor a motor-vehicle

engine, nor an engine used solely for competition (see the definition of nonroad engine in §1068.025). In general this includes fixed engines and all portable or transportable engines that stay in a single site at a building, structure, facility, or installation for at least a full year; this does not include an engine installed in equipment that has the ability to propel itself. For year-round sources, a full year is 12 consecutive months. For seasonal sources, a full year is a full annual operating period of at least three months. A seasonal source is a site with engines operating only part of the year for at least two consecutive years. If you replace an engine with one that does the same or similar work in the same place, you may apply the previous engine's service to your calculation for residence time.

Stoichiometry means the proportion of a mixture of air and fuel such that the fuel is fully oxidized with no remaining oxygen. For example, stoichiometric combustion in gasoline engines typically occurs at an air-fuel mass ratio of about 14.7.

Suspend means to temporarily discontinue the certificate for an engine family. If we suspend a certificate, you may not sell vehicles or engines from that engine family unless we reinstate the certificate or approve a new one.

Test engine means an engine in a test sample.

Test sample means the collection of engines selected from the population of an engine family for emission testing.

Total hydrocarbon means the combined mass organic compounds measured by our total hydrocarbon test procedure, expressed as a hydrocarbon with a hydrogen-to-carbon mass ratio of 1.85:1.

Total hydrocarbon equivalent means the sum of the carbon mass contributions of non-oxygenated hydrocarbons, alcohols and aldehydes, or other organic compounds that are measured separately as contained in a gas sample, expressed as petroleum-fueled engine hydrocarbons. The hydrogen-to-carbon ratio of the equivalent hydrocarbon is 1.85:1.

Ultimate buyer means ultimate purchaser.

Ultimate purchaser means, with respect to any new nonroad equipment or new nonroad engine, the first person who in good faith purchases such new nonroad equipment or new nonroad engine for purposes other than resale.

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands.

Useful life means the period during which the engine is designed to properly function in terms of reliability and fuel consumption, without being remanufactured, specified as a number of hours of operation or calendar years. It is the period during which a new engine is required to comply with all applicable emission standards.

U.S.-directed production volume means the number of engine units, subject to the requirements of this part, produced by a manufacturer for which the manufacturer has a reasonable assurance that sale was or will be made to ultimate buyers in the Unites States.

Void means to invalidate a certificate or an exemption. If we void a certificate, all the vehicles produced under that engine family for that model year are considered noncompliant, and you are liable for each vehicle produced under the certificate and may face civil or criminal penalties or both. If we void an exemption, all the vehicles produced under that exemption are considered uncertified (or nonconforming), and you are liable for each vehicle produced under the exemption and may face civil or criminal penalties or both. You may not produce any additional vehicles using the voided exemption.

Volatile liquid fuel means any fuel other than diesel or biodiesel that is a liquid at atmospheric pressure.

§1048.705 What symbols, acronyms, and abbreviations does this part use?

The following symbols, acronyms, and abbreviations apply to this part.

° C	degrees Celsius
ASTM	American Society for Testing and Materials
cc	cubic centimeters
CO	carbon monoxide
CO_2	carbon dioxide
EPA	Environmental Protection Agency
g/kW-hr	grams per kilowatt-hour
LPG	liquefied petroleum gas

m	meters
mm Hg	millimeters of mercury
NMHC	nonmethane hydrocarbons
NOx	oxides of nitrogen (NO and NO_2)
rpm	revolutions per minute
SAE	Society of Automotive Engineers
SI	spark-ignition
THC	total hydrocarbon
THCE	total hydrocarbon equivalent
U.S.C.	United States Code

§1048.710 What materials does this part reference?

We have incorporated by reference the documents listed in this section. The Director of the Federal Register approved the incorporation by reference as prescribed in 5 U.S.C. 552(a) and 1 CFR part 51. Anyone may inspect copies at:

U.S. EPA
OAR, Air and Radiation Docket and Information Center
401 M Street, SW
Washington, DC 20460

or at

Office of the Federal Register
800 N. Capitol St. NW, 7th Floor, Suite 700
Washington, DC 20001

(1) ASTM material. Table 1 of §1048.710 lists material from the American Society for Testing and Materials that we have incorporated by reference. The first column lists the number and name of the material. The second column lists the sections of this part where we reference it. The second column is for information only and may not include all locations. Anyone may receive copies of these materials from:

American Society for Testing and Materials
1916 Race St.
Philadelphia, PA 19103

Table 1 of §1048.710—ASTM Materials

Document number and name	part 1048 reference
ASTM E29-93a:	1048.240
Standard Practice for Using Significant	1048.315
Digits in Test Data to Determine	1048.345
Conformance with Specifications	1048.410
	1048.415

(2) ISO material. Table 2 of §1048.710 lists material from the International Organization for Standardization that we have incorporated by reference. The first column lists the number and name of the material. The second column lists the section of this part where we reference it. The second column is for information only and may not be all-inclusive. Anyone may receive copies of these materials from:

International Organization for Standardization
Case Postale 56,
CH-1211 Geneva 20
Switzerland

Table 2 of §1048.710—ISO Materials

Document number and name	part 1048 reference
ISO 9141-2 "Road vehicles—Diagnostic systems—Part 2: CARB requirements for interchange of digital information," (February 1994).	1048.110
ISO 14230-4 "Road vehicles—Diagnostic systems—KWP 2000 requirements for Emission-related systems," (June 2000).	1048.110

§1048.715 How should I request EPA to keep my information confidential?

(a) Clearly show what you consider confidential by marking, circling, bracketing, stamping, or some other method. We will store your confidential information as described in 40 CFR part 2. Also, we will disclose it only as specified in 40 CFR part 2.

(b) If you send us a second copy without the confidential information, we will assume it contains nothing confidential whenever we need to release information from it.

(c) If you send us information without claiming it is confidential, we may make it available to the public without further notice to you, as described in §2.204 of this chapter.

§1048.720 How do I request a public hearing?

(a) File a request for a hearing with the Designated Officer within 15 days of a decision to deny, suspend, revoke, or void your certificate. If you ask later, we may give you a hearing for good cause, but we don't have to.

(b) Include the following in your request for a public hearing:

(1) State which engine family is involved.

(2) State the issues you intend to raise. We may limit these issues, as described elsewhere in this part.

(3) Summarize the evidence supporting your position and state why you believe this evidence justifies granting or reinstating the certificate.

(c) We will hold the hearing as described in 40 CFR part 1068, subpart F.

Appendix I to Part 1048—Transient Duty Cycle for Constant-Speed Engines

Time (s)	Normalized Speed	Normalized Torque
1	58%	5%
2	58%	5%
3	58%	5%
4	58%	5%
5	58%	5%
6	58%	5%
7	58%	5%
8	58%	5%
9	58%	5%
10	58%	5%
11	58%	5%
12	65%	8%
13	72%	9%
14	79%	12%
15	86%	14%
16	93%	16%
17	93%	16%
18	93%	16%
19	93%	16%
20	93%	16%
21	93%	16%
22	93%	16%
23	93%	16%
24	93%	31%
25	93%	30%
26	93%	27%
27	93%	23%
28	93%	24%
29	93%	21%
30	93%	20%
31	93%	18%
32	93%	16%
33	93%	18%
34	93%	16%
35	93%	17%
36	93%	20%
37	93%	20%
38	93%	22%
39	93%	20%
40	93%	17%
41	93%	17%
42	93%	17%
43	93%	16%
44	93%	18%
45	93%	18%
46	93%	21%
47	93%	21%
48	93%	18%
49	94%	24%
50	93%	28%
51	93%	23%
52	93%	19%
53	93%	20%
54	93%	20%
55	93%	29%
56	93%	23%
57	93%	25%
58	93%	23%
59	93%	23%
60	93%	23%
61	93%	22%
62	93%	21%
63	93%	22%
64	93%	30%
65	93%	33%
66	93%	25%
67	93%	29%
68	93%	27%
69	93%	23%
70	93%	21%
71	93%	21%
72	93%	19%
73	93%	20%
74	93%	24%
75	93%	23%
76	93%	21%
77	93%	44%
78	93%	34%
79	93%	28%
80	93%	37%
81	93%	29%
82	93%	27%
83	93%	33%
84	93%	28%
85	93%	22%
86	96%	30%
87	95%	25%
88	95%	17%
89	95%	13%
90	95%	10%
91	95%	9%
92	95%	8%
93	95%	7%
94	95%	7%
95	95%	6%
96	95%	6%
97	93%	37%
98	93%	35%
99	93%	29%
100	93%	23%
101	93%	23%
102	93%	21%
103	93%	20%
104	93%	29%
105	93%	27%
106	93%	26%
107	93%	35%
108	93%	43%
109	95%	35%
110	95%	24%
111	95%	17%
112	95%	13%
113	95%	10%
114	95%	9%
115	95%	8%
116	95%	7%
117	95%	7%
118	95%	6%
119	93%	36%
120	93%	30%
121	93%	25%
122	93%	21%
123	93%	22%
124	93%	19%
125	93%	34%
126	93%	36%
127	93%	31%
128	93%	26%
129	93%	27%
130	93%	22%
131	93%	22%
132	93%	18%
133	93%	18%
134	93%	19%
135	93%	19%
136	93%	23%
137	93%	22%
138	93%	20%
139	93%	23%
140	93%	20%
141	93%	18%
142	93%	18%
143	93%	16%
144	93%	19%
145	94%	25%
146	93%	30%
147	93%	29%
148	93%	23%
149	93%	24%
150	93%	22%
151	94%	20%
152	93%	17%
153	93%	16%
154	93%	16%
155	93%	15%
156	93%	17%
157	93%	18%
158	93%	20%
159	93%	21%
160	93%	18%
161	93%	17%
162	92%	54%
163	93%	38%
164	93%	29%
165	93%	24%
166	93%	24%
167	93%	24%
168	93%	23%
169	93%	20%
170	93%	20%
171	93%	18%
172	93%	19%
173	93%	19%
174	93%	16%
175	93%	16%
176	93%	16%
177	93%	18%
178	93%	21%
179	93%	20%
180	93%	20%
181	93%	17%
182	93%	19%
183	93%	17%
184	93%	18%
185	93%	16%
186	93%	16%

Time (s)	Normalized Speed	Normalized Torque						
187	93%	16%	249	95%	10%	311	93%	31%
188	93%	17%	250	95%	9%	312	93%	32%
189	93%	16%	251	95%	8%	313	93%	31%
190	93%	17%	252	96%	7%	314	93%	30%
191	93%	18%	253	95%	7%	315	93%	23%
192	93%	17%	254	95%	6%	316	93%	23%
193	93%	16%	255	92%	42%	317	93%	36%
194	93%	17%	256	93%	36%	318	93%	32%
195	93%	17%	257	93%	33%	319	93%	25%
196	93%	22%	258	92%	60%	320	93%	31%
197	93%	19%	259	93%	48%	321	93%	33%
198	93%	19%	260	93%	36%	322	93%	31%
199	95%	21%	261	93%	30%	323	93%	27%
200	95%	16%	262	93%	28%	324	93%	24%
201	95%	12%	263	93%	24%	325	93%	19%
202	95%	10%	264	93%	24%	326	96%	21%
203	96%	8%	265	93%	23%	327	96%	16%
204	96%	7%	266	93%	23%	328	95%	12%
205	95%	7%	267	93%	25%	329	95%	10%
206	96%	7%	268	93%	27%	330	95%	8%
207	95%	6%	269	93%	29%	331	95%	8%
208	96%	6%	270	93%	26%	332	95%	7%
209	96%	6%	271	93%	26%	333	95%	7%
210	88%	6%	272	93%	21%	334	95%	6%
211	89%	48%	273	93%	23%	335	95%	6%
212	93%	34%	274	93%	23%	336	95%	6%
213	93%	27%	275	94%	23%	337	87%	6%
214	93%	26%	276	93%	40%	338	57%	6%
215	93%	25%	277	94%	67%	339	58%	6%
216	93%	22%	278	93%	46%	340	58%	6%
217	93%	23%	279	93%	38%	341	58%	6%
218	93%	21%	280	93%	29%	342	58%	6%
219	93%	21%	281	93%	28%	343	58%	6%
220	93%	23%	282	93%	27%	344	58%	6%
221	93%	23%	283	93%	29%	345	58%	6%
222	93%	23%	284	93%	28%	346	58%	6%
223	93%	23%	285	94%	34%	347	58%	6%
224	93%	23%	286	93%	31%	348	58%	6%
225	93%	22%	287	93%	30%	349	58%	6%
226	93%	22%	288	94%	42%	350	58%	6%
227	93%	24%	289	93%	31%	351	58%	6%
228	93%	23%	290	93%	29%	352	95%	73%
229	93%	23%	291	93%	27%	353	93%	65%
230	93%	21%	292	93%	23%	354	93%	52%
231	93%	20%	293	93%	23%	355	93%	38%
232	93%	20%	294	93%	20%	356	93%	30%
233	93%	20%	295	93%	20%	357	93%	31%
234	93%	22%	296	93%	23%	358	93%	26%
235	93%	26%	297	93%	23%	359	93%	21%
236	93%	22%	298	93%	24%	360	93%	22%
237	93%	20%	299	93%	25%	361	93%	26%
238	93%	18%	300	93%	20%	362	93%	23%
239	93%	22%	301	93%	25%	363	93%	19%
240	93%	20%	302	93%	23%	364	93%	27%
241	94%	27%	303	93%	23%	365	93%	42%
242	93%	22%	304	93%	24%	366	93%	29%
243	93%	23%	305	93%	28%	367	94%	25%
244	93%	21%	306	93%	23%	368	94%	26%
245	93%	22%	307	93%	24%	369	94%	29%
246	95%	22%	308	93%	34%	370	93%	28%
247	95%	16%	309	93%	31%	371	93%	23%
248	95%	12%	310	93%	35%	372	93%	21%

Time (s)	Norm-alized Speed	Norm-alized Torque						
373	93%	26%	435	58%	6%	497	93%	23%
374	93%	23%	436	58%	6%	498	93%	24%
375	93%	20%	437	58%	6%	499	93%	24%
376	94%	23%	438	58%	6%	500	93%	20%
377	93%	18%	439	58%	6%	501	93%	19%
378	93%	19%	440	58%	6%	502	93%	16%
379	93%	23%	441	58%	6%	503	93%	21%
380	93%	19%	442	58%	6%	504	93%	23%
381	93%	16%	443	93%	66%	505	93%	24%
382	93%	25%	444	93%	48%	506	93%	22%
383	93%	22%	445	93%	40%	507	93%	18%
384	93%	20%	446	93%	34%	508	93%	21%
385	93%	25%	447	93%	28%	509	95%	18%
386	94%	28%	448	93%	23%	510	95%	20%
387	93%	23%	449	93%	28%	511	95%	15%
388	93%	23%	450	93%	27%	512	96%	11%
389	93%	25%	451	93%	23%	513	95%	10%
390	93%	23%	452	93%	19%	514	96%	8%
391	93%	20%	453	93%	25%	515	95%	7%
392	93%	19%	454	93%	24%	516	95%	7%
393	93%	24%	455	93%	22%	517	95%	7%
394	93%	20%	456	93%	31%	518	95%	6%
395	93%	18%	457	93%	36%	519	96%	6%
396	93%	21%	458	93%	28%	520	96%	6%
397	95%	22%	459	93%	25%	521	83%	6%
398	96%	16%	460	93%	35%	522	56%	6%
399	96%	12%	461	93%	34%	523	58%	6%
400	95%	10%	462	93%	29%	524	72%	54%
401	96%	9%	463	93%	37%	525	94%	51%
402	95%	8%	464	93%	36%	526	93%	42%
403	96%	7%	465	93%	38%	527	93%	42%
404	96%	7%	466	93%	31%	528	93%	31%
405	96%	6%	467	93%	29%	529	93%	25%
406	96%	6%	468	93%	34%	530	93%	21%
407	95%	6%	469	93%	36%	531	93%	17%
408	91%	6%	470	93%	34%	532	93%	15%
409	58%	6%	471	93%	31%	533	93%	15%
410	58%	6%	472	93%	26%	534	93%	16%
411	58%	6%	473	93%	21%	535	93%	15%
412	58%	6%	474	94%	16%	536	93%	14%
413	58%	6%	475	96%	19%	537	93%	15%
414	58%	6%	476	96%	15%	538	93%	16%
415	58%	6%	477	95%	11%	539	94%	15%
416	58%	6%	478	96%	10%	540	93%	45%
417	58%	6%	479	95%	8%	541	93%	45%
418	58%	6%	480	95%	7%	542	93%	41%
419	58%	6%	481	95%	7%	543	93%	33%
420	58%	6%	482	96%	7%	544	93%	26%
421	58%	6%	483	96%	6%	545	93%	21%
422	58%	6%	484	96%	6%	546	93%	20%
423	58%	6%	485	95%	6%	547	93%	17%
424	58%	6%	486	85%	6%	548	93%	16%
425	58%	6%	487	56%	74%	549	93%	17%
426	58%	6%	488	93%	52%	550	93%	16%
427	58%	6%	489	93%	42%	551	93%	14%
428	58%	6%	490	93%	36%	552	93%	16%
429	58%	6%	491	93%	35%	553	93%	15%
430	58%	6%	492	93%	33%	554	93%	14%
431	58%	6%	493	93%	38%	555	93%	16%
432	58%	6%	494	93%	40%	556	93%	15%
433	58%	6%	495	93%	29%	557	93%	14%
434	58%	6%	496	93%	23%	558	93%	13%

Time (s)	Norm-alized Speed	Norm-alized Torque						
559	93%	14%	621	98%	9%	683	98%	8%
560	93%	14%	622	98%	7%	684	98%	7%
561	93%	15%	623	98%	7%	685	98%	6%
562	93%	17%	624	98%	6%	686	98%	6%
563	93%	17%	625	98%	6%	687	98%	6%
564	93%	22%	626	98%	6%	688	98%	6%
565	93%	22%	627	98%	5%	689	98%	5%
566	93%	19%	628	69%	6%	690	81%	5%
567	93%	19%	629	49%	5%	691	49%	5%
568	93%	20%	630	51%	5%	692	78%	48%
569	93%	18%	631	51%	5%	693	95%	37%
570	93%	20%	632	51%	5%	694	95%	31%
571	93%	20%	633	51%	6%	695	94%	32%
572	93%	42%	634	51%	6%	696	94%	34%
573	93%	32%	635	51%	6%	697	95%	29%
574	93%	25%	636	51%	6%	698	95%	25%
575	93%	26%	637	51%	5%	699	94%	26%
576	93%	23%	638	51%	5%	700	95%	28%
577	93%	21%	639	51%	5%	701	95%	27%
578	93%	23%	640	51%	5%	702	94%	28%
579	93%	19%	641	51%	6%	703	95%	30%
580	93%	21%	642	51%	6%	704	95%	27%
581	93%	20%	643	51%	6%	705	95%	26%
582	93%	20%	644	51%	6%	706	95%	27%
583	93%	20%	645	51%	5%	707	95%	25%
584	93%	18%	646	51%	6%	708	95%	26%
585	93%	18%	647	51%	5%	709	95%	25%
586	93%	21%	648	51%	6%	710	95%	23%
587	93%	19%	649	51%	5%	711	95%	20%
588	93%	21%	650	96%	35%	712	95%	23%
589	93%	19%	651	95%	29%	713	95%	20%
590	93%	19%	652	95%	26%	714	95%	18%
591	93%	18%	653	95%	31%	715	94%	22%
592	93%	18%	654	95%	34%	716	95%	19%
593	93%	17%	655	95%	29%	717	95%	23%
594	93%	16%	656	95%	29%	718	95%	27%
595	93%	16%	657	95%	30%	719	95%	26%
596	93%	15%	658	95%	24%	720	95%	23%
597	93%	16%	659	95%	19%	721	95%	20%
598	93%	19%	660	95%	23%	722	99%	23%
599	93%	52%	661	95%	21%	723	98%	20%
600	93%	45%	662	95%	22%	724	98%	14%
601	95%	39%	663	95%	19%	725	98%	11%
602	95%	39%	664	95%	18%	726	98%	9%
603	95%	39%	665	95%	20%	727	98%	8%
604	95%	39%	666	94%	60%	728	98%	7%
605	94%	30%	667	95%	48%	729	98%	6%
606	95%	30%	668	95%	39%	730	98%	6%
607	95%	29%	669	95%	36%	731	98%	6%
608	95%	24%	670	95%	27%	732	98%	5%
609	94%	30%	671	95%	22%	733	98%	5%
610	95%	28%	672	95%	19%	734	73%	6%
611	94%	25%	673	95%	22%	735	49%	5%
612	94%	29%	674	95%	19%	736	50%	77%
613	95%	32%	675	94%	17%	737	95%	39%
614	95%	33%	676	95%	27%	738	95%	30%
615	95%	44%	677	95%	24%	739	95%	28%
616	99%	37%	678	98%	19%	740	94%	31%
617	98%	27%	679	98%	19%	741	95%	36%
618	98%	19%	680	98%	14%	742	95%	36%
619	98%	13%	681	98%	11%	743	95%	30%
620	98%	11%	682	98%	9%	744	95%	26%

Time (s)	Norm-alized Speed	Norm-alized Torque						
745	95%	27%	807	95%	19%	869	51%	6%
746	95%	22%	808	94%	20%	870	51%	5%
747	95%	18%	809	94%	22%	871	51%	6%
748	95%	19%	810	94%	22%	872	51%	7%
749	95%	25%	811	94%	22%	873	96%	45%
750	94%	25%	812	95%	23%	874	94%	44%
751	95%	21%	813	94%	22%	875	94%	34%
752	95%	22%	814	95%	22%	876	94%	41%
753	95%	27%	815	95%	19%	877	95%	44%
754	95%	27%	816	95%	16%	878	94%	32%
755	95%	27%	817	95%	14%	879	95%	26%
756	95%	24%	818	95%	18%	880	94%	20%
757	94%	20%	819	95%	18%	881	95%	29%
758	94%	23%	820	94%	20%	882	95%	27%
759	94%	26%	821	94%	22%	883	95%	21%
760	95%	25%	822	94%	19%	884	95%	34%
761	95%	25%	823	95%	18%	885	95%	31%
762	95%	21%	824	95%	17%	886	94%	26%
763	95%	28%	825	95%	19%	887	95%	22%
764	94%	39%	826	95%	19%	888	95%	23%
765	95%	32%	827	95%	19%	889	95%	19%
766	95%	24%	828	94%	19%	890	94%	18%
767	95%	19%	829	94%	21%	891	94%	20%
768	98%	20%	830	94%	19%	892	94%	26%
769	98%	17%	831	94%	17%	893	95%	29%
770	98%	12%	832	94%	18%	894	94%	32%
771	98%	10%	833	94%	21%	895	95%	26%
772	98%	8%	834	94%	19%	896	95%	34%
773	98%	7%	835	95%	18%	897	95%	30%
774	98%	6%	836	95%	19%	898	95%	24%
775	98%	6%	837	95%	17%	899	95%	19%
776	95%	61%	838	94%	15%	900	94%	17%
777	94%	51%	839	94%	17%	901	94%	16%
778	95%	40%	840	95%	19%	902	98%	19%
779	94%	35%	841	94%	22%	903	98%	17%
780	94%	36%	842	94%	21%	904	98%	12%
781	94%	32%	843	94%	18%	905	98%	10%
782	95%	24%	844	94%	16%	906	98%	8%
783	94%	19%	845	95%	14%	907	98%	7%
784	94%	19%	846	95%	14%	908	98%	6%
785	95%	19%	847	94%	19%	909	98%	6%
786	95%	19%	848	95%	20%	910	98%	6%
787	94%	18%	849	95%	23%	911	98%	5%
788	94%	20%	850	98%	23%	912	98%	5%
789	94%	23%	851	98%	22%	913	98%	5%
790	94%	22%	852	98%	16%	914	69%	5%
791	95%	23%	853	98%	12%	915	49%	5%
792	94%	20%	854	98%	9%	916	51%	5%
793	94%	18%	855	98%	8%	917	51%	6%
794	95%	16%	856	98%	7%	918	51%	6%
795	95%	17%	857	98%	6%	919	69%	75%
796	94%	16%	858	98%	6%	920	95%	70%
797	94%	16%	859	98%	6%	921	95%	57%
798	94%	17%	860	98%	5%	922	94%	49%
799	94%	18%	861	98%	5%	923	94%	38%
800	94%	21%	862	80%	5%	924	95%	43%
801	95%	21%	863	49%	5%	925	94%	51%
802	94%	19%	864	51%	5%	926	94%	41%
803	95%	18%	865	51%	5%	927	98%	42%
804	94%	19%	866	51%	6%	928	95%	89%
805	95%	22%	867	51%	6%	929	95%	66%
806	95%	21%	868	51%	6%	930	94%	52%

Time (s)	Norm-alized Speed	Norm-alized Torque						
931	95%	41%	993	95%	27%	1055	94%	41%
932	95%	34%	994	95%	29%	1056	95%	28%
933	95%	34%	995	98%	22%	1057	95%	36%
934	94%	30%	996	94%	84%	1058	94%	30%
935	94%	30%	997	94%	74%	1059	94%	26%
936	95%	29%	998	95%	62%	1060	94%	33%
937	94%	28%	999	94%	51%	1061	95%	34%
938	95%	24%	1000	95%	50%	1062	95%	27%
939	94%	34%	1001	95%	81%	1063	98%	26%
940	95%	26%	1002	94%	65%	1064	98%	19%
941	94%	36%	1003	95%	49%	1065	98%	13%
942	95%	27%	1004	94%	56%	1066	98%	11%
943	95%	25%	1005	95%	65%	1067	98%	9%
944	95%	26%	1006	94%	59%	1068	98%	7%
945	94%	21%	1007	99%	58%	1069	98%	7%
946	94%	19%	1008	98%	41%	1070	98%	6%
947	98%	21%	1009	98%	27%	1071	98%	6%
948	93%	53%	1010	98%	19%	1072	98%	6%
949	94%	45%	1011	98%	13%	1073	98%	5%
950	94%	35%	1012	98%	11%	1074	89%	6%
951	95%	28%	1013	98%	9%	1075	49%	5%
952	95%	23%	1014	98%	8%	1076	51%	6%
953	95%	20%	1015	98%	7%	1077	51%	6%
954	95%	17%	1016	98%	6%	1078	51%	6%
955	94%	19%	1017	98%	6%	1079	51%	6%
956	94%	18%	1018	98%	6%	1080	51%	6%
957	94%	18%	1019	71%	6%	1081	51%	6%
958	94%	18%	1020	49%	5%	1082	51%	6%
959	94%	19%	1021	51%	6%	1083	50%	6%
960	97%	17%	1022	51%	6%	1084	51%	6%
961	98%	19%	1023	51%	6%	1085	51%	6%
962	98%	14%	1024	51%	6%	1086	51%	6%
963	98%	11%	1025	51%	6%	1087	51%	6%
964	98%	9%	1026	51%	6%	1088	51%	6%
965	98%	7%	1027	51%	6%	1089	51%	6%
966	98%	7%	1028	51%	6%	1090	51%	6%
967	98%	6%	1029	51%	6%	1091	56%	74%
968	98%	6%	1030	51%	6%	1092	95%	56%
969	98%	6%	1031	51%	5%	1093	94%	49%
970	98%	5%	1032	51%	6%	1094	95%	47%
971	98%	5%	1033	51%	5%	1095	94%	43%
972	82%	5%	1034	51%	6%	1096	94%	33%
973	49%	5%	1035	51%	6%	1097	95%	50%
974	51%	6%	1036	51%	6%	1098	94%	40%
975	51%	6%	1037	51%	5%	1099	95%	33%
976	51%	6%	1038	51%	5%	1100	95%	24%
977	51%	5%	1039	51%	6%	1101	94%	22%
978	51%	6%	1040	51%	6%	1102	94%	22%
979	72%	58%	1041	69%	59%	1103	94%	25%
980	94%	36%	1042	94%	48%	1104	95%	27%
981	95%	28%	1043	95%	34%	1105	95%	32%
982	95%	24%	1044	95%	29%	1106	94%	29%
983	95%	25%	1045	95%	26%	1107	94%	26%
984	95%	26%	1046	94%	27%	1108	94%	26%
985	94%	30%	1047	95%	31%	1109	94%	24%
986	94%	26%	1048	95%	26%	1110	98%	52%
987	95%	34%	1049	95%	34%	1111	94%	41%
988	95%	57%	1050	95%	29%	1112	99%	35%
989	95%	45%	1051	95%	31%	1113	95%	58%
990	94%	37%	1052	95%	29%	1114	95%	58%
991	95%	34%	1053	95%	35%	1115	98%	57%
992	95%	27%	1054	95%	38%	1116	98%	38%

Time (s)	Normalized Speed	Normalized Torque
1117	98%	26%
1118	93%	63%
1119	94%	59%
1120	98%	100%
1121	94%	73%
1122	98%	53%
1123	94%	76%
1124	95%	61%
1125	94%	49%
1126	94%	37%
1127	97%	50%
1128	98%	36%
1129	98%	25%
1130	98%	18%
1131	98%	12%
1132	98%	10%
1133	98%	8%
1134	98%	7%
1135	98%	7%
1136	98%	6%
1137	98%	6%
1138	98%	6%
1139	80%	6%
1140	49%	6%
1141	78%	61%
1142	95%	50%
1143	94%	43%
1144	94%	42%
1145	94%	31%
1146	95%	30%
1147	95%	34%
1148	95%	28%
1149	95%	27%
1150	94%	27%
1151	95%	31%
1152	95%	42%
1153	94%	41%
1154	95%	37%
1155	95%	43%
1156	95%	34%
1157	95%	31%
1158	95%	27%
1159	95%	23%
1160	95%	27%
1161	96%	38%
1162	95%	40%
1163	95%	39%
1164	95%	26%
1165	95%	33%
1166	94%	28%
1167	94%	34%
1168	98%	73%
1169	95%	49%
1170	95%	51%
1171	94%	55%
1172	95%	48%
1173	95%	35%
1174	95%	39%
1175	95%	39%
1176	94%	41%
1177	95%	30%
1178	95%	23%
1179	94%	19%
1180	95%	25%
1181	94%	29%
1182	98%	27%
1183	95%	89%
1184	95%	74%
1185	94%	60%
1186	94%	48%
1187	94%	41%
1188	94%	29%
1189	94%	24%
1190	95%	19%
1191	94%	21%
1192	95%	29%
1193	95%	28%
1194	95%	27%
1195	94%	23%
1196	95%	25%
1197	95%	26%
1198	94%	22%
1199	95%	19%
1200	94%	17%

Appendix I to Part 1048—Transient Duty Cycle for Constant-Speed Engines

Time (s)	Normalized Speed	Normalized Torque
0	0%	0%
1	0%	0%
2	0%	0%
3	0%	0%
4	0%	0%
5	0%	0%
6	0%	0%
7	0%	0%
8	0%	0%
9	1%	8%
10	6%	54%
11	8%	61%
12	34%	59%
13	22%	46%
14	5%	51%
15	18%	51%
16	31%	50%
17	30%	56%
18	31%	49%
19	25%	66%
20	58%	55%
21	43%	31%
22	16%	45%
23	24%	38%
24	24%	27%
25	30%	33%
26	45%	65%
27	50%	49%
28	23%	42%
29	13%	42%
30	9%	45%
31	23%	30%
32	37%	45%
33	44%	50%
34	49%	52%
35	55%	49%
36	61%	46%
37	66%	38%
38	42%	33%
39	17%	41%
40	17%	37%
41	7%	50%
42	20%	32%
43	5%	55%
44	30%	42%
45	44%	53%
46	45%	56%
47	41%	52%
48	24%	41%
49	15%	40%
50	11%	44%
51	32%	31%
52	38%	54%
53	38%	47%
54	9%	55%
55	10%	50%
56	33%	55%
57	48%	56%
58	49%	47%
59	33%	44%
60	52%	43%
61	55%	43%
62	59%	38%
63	44%	28%
64	24%	37%
65	12%	44%
66	9%	47%
67	12%	52%
68	34%	21%
69	29%	44%
70	44%	54%
71	54%	62%
72	62%	57%
73	72%	56%
74	88%	71%
75	100%	69%
76	100%	34%
77	100%	42%
78	100%	54%
79	100%	58%
80	100%	38%
81	83%	17%
82	61%	15%
83	43%	22%
84	24%	35%
85	16%	39%
86	15%	45%
87	32%	34%
88	14%	42%
89	8%	48%
90	5%	51%
91	10%	41%
92	12%	37%
93	4%	47%
94	3%	49%
95	3%	50%
96	4%	49%
97	4%	48%
98	8%	43%
99	2%	51%
100	5%	46%
101	8%	41%
102	4%	47%
103	3%	49%
104	6%	45%
105	3%	48%
106	10%	42%
107	18%	27%
108	3%	50%
109	11%	41%
110	34%	29%
111	51%	57%
112	67%	63%
113	61%	32%
114	44%	31%
115	48%	54%
116	69%	65%
117	85%	65%
118	81%	29%
119	74%	21%
120	62%	23%
121	76%	58%
122	96%	75%
123	100%	77%
124	100%	27%
125	100%	79%
126	100%	79%
127	100%	81%
128	100%	57%
129	99%	52%
130	81%	35%
131	69%	29%
132	47%	22%
133	34%	28%
134	27%	37%
135	83%	60%
136	100%	74%
137	100%	7%
138	100%	2%
139	70%	18%
140	23%	39%
141	5%	54%
142	11%	40%
143	11%	34%
144	11%	41%
145	19%	25%
146	16%	32%
147	20%	31%
148	21%	38%
149	21%	42%
150	9%	51%
151	4%	49%
152	2%	51%
153	1%	58%
154	21%	57%
155	29%	47%
156	33%	45%
157	16%	49%
158	38%	45%
159	37%	43%
160	35%	42%
161	39%	43%
162	51%	49%
163	59%	55%
164	65%	54%
165	76%	62%
166	84%	59%
167	83%	29%
168	67%	35%
169	84%	54%
170	90%	58%
171	93%	43%
172	90%	29%
173	66%	19%
174	52%	16%
175	49%	17%
176	56%	38%
177	73%	71%
178	86%	80%
179	96%	75%
180	89%	27%
181	66%	17%
182	50%	18%
183	36%	25%
184	36%	24%
185	38%	40%
186	40%	50%
187	27%	48%
188	19%	48%

189	23%	50%
190	19%	45%
191	6%	51%
192	24%	48%
193	49%	67%
194	47%	49%
195	22%	44%
196	25%	40%
197	38%	54%
198	43%	55%
199	40%	52%
200	14%	49%
201	11%	45%
202	7%	48%
203	26%	41%
204	41%	59%
205	53%	60%
206	44%	54%
207	22%	40%
208	24%	41%
209	32%	53%
210	44%	74%
211	57%	25%
212	22%	49%
213	29%	45%
214	19%	37%
215	14%	43%
216	36%	40%
217	43%	63%
218	42%	49%
219	15%	50%
220	19%	44%
221	47%	59%
222	67%	80%
223	76%	74%
224	87%	66%
225	98%	61%
226	100%	38%
227	97%	27%
228	100%	53%
229	100%	72%
230	100%	49%
231	100%	4%
232	100%	13%
233	87%	15%
234	53%	26%
235	33%	27%
236	39%	19%
237	51%	33%
238	67%	54%
239	83%	60%
240	95%	52%
241	100%	50%
242	100%	36%
243	100%	25%
244	85%	16%
245	62%	16%
246	40%	26%
247	56%	39%
248	81%	75%
249	98%	86%
250	100%	76%
251	100%	51%
252	100%	78%
253	100%	83%
254	100%	100%
255	100%	66%
256	100%	85%
257	100%	72%
258	100%	45%
259	98%	58%
260	60%	30%
261	43%	32%
262	71%	36%
263	44%	32%
264	24%	38%
265	42%	17%
266	22%	51%
267	13%	53%
268	23%	45%
269	29%	50%
270	28%	42%
271	21%	55%
272	34%	57%
273	44%	47%
274	19%	46%
275	13%	44%
276	25%	36%
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1153	93%	17%
1154	93%	23%
1155	93%	26%
1156	93%	22%
1157	93%	18%
1158	93%	16%
1159	93%	16%
1160	93%	17%
1161	93%	19%
1162	93%	18%
1163	93%	16%

1164	93%	19%
1165	93%	22%
1166	93%	25%
1167	93%	29%
1168	93%	27%
1169	93%	22%
1170	93%	18%
1171	93%	16%
1172	93%	19%
1173	93%	19%
1174	93%	17%
1175	93%	17%
1176	93%	17%
1177	93%	16%
1178	93%	16%
1179	93%	15%
1180	93%	16%
1181	93%	15%
1182	93%	17%
1183	93%	21%
1184	93%	30%
1185	93%	53%
1186	93%	54%
1187	93%	38%
1188	93%	30%
1189	93%	24%
1190	93%	20%
1191	95%	20%
1192	96%	18%
1193	96%	15%
1194	96%	11%
1195	95%	9%
1196	95%	8%
1197	96%	7%
1198	94%	33%
1199	93%	46%
1200	93%	37%
1201	16%	8%
1202	0%	0%
1203	0%	0%
1204	0%	0%
1205	0%	0%
1206	0%	0%
1207	0%	0%
1208	0%	0%
1209	0%	0%

PART 1051—CONTROL OF EMISSIONS FROM RECREATIONAL ENGINES AND VEHICLES

Subpart A—Determining how to follow this part

Sec.

Subpart B—Emission standards and related requirements

Subpart C—Certifying engine families

Subpart D—Testing production-line engines

Subpart E—Testing in-use engines

Subpart F—Test Procedures

Subpart G—Compliance provisions

Subpart H—Averaging, banking, and trading for certification

Subpart I—Definitions and other reference information

Authority: 42 U.S.C. 7401 - 7671(q)

Subpart A—Determining how to follow this part

§1051.001 Does this part apply to me?

(a) This part applies to you if you manufacture or import any of the following recreational vehicles or engines used in them, unless we exclude them under §1051.005 or exempt them under §1051.620:

(1) Snowmobiles.

(2) Off-highway motorcycles.

(3) All-terrain vehicles (ATVs).

(b) Note in subpart G of this part that part 1068 of this chapter applies to everyone, including anyone who manufactures, installs, owns, operates, or rebuilds any of the vehicles or engines this part covers.

(c) You need not follow this part for vehicles you produce before the 2006 model year, unless you certify voluntarily. See §1051.101, §1051.145, and the definition of model year in §1051.801 for more information about the timing of new requirements.

(d) See §§1051.801 and 1051.805 for definitions and acronyms that apply to this part.

§1051.005 May I exclude any vehicles from this part's requirements?

(a) You may exclude vehicles with compression-ignition engines. See 40 CFR part 89 for regulations that cover these engines.

(b) See subpart G of this part and part 1068, subpart C of this chapter, for exemptions of specific engines.

(c) We may require you to label an engine or vehicle (or both) if this section excludes it and other requirements in this chapter do not apply.

(d) Send the Designated Officer a written request with supporting documentation if you want us to determine whether this part covers or excludes certain vehicles. Another part of the CFR may regulate vehicles we exclude from this part.

§1051.010 What main steps must I take to comply with this part?

(a) You must get a certificate of conformity from us for each engine family before do any of the following things with a new vehicle or new engine covered by this part: sell, offer for sale, introduce into commerce, distribute or deliver for introduction into commerce, or import it into the United States. "New" vehicles or engines may include some already placed in service (see the definition of "new" in §1051.801). You must get a new certificate of conformity for each new model year.

(b) To get a certificate of conformity and comply with its terms, you must do four things:

(1) Meet the emission standards and other requirements in subpart B of this part.

(2) Apply for certification (see subpart C of this part).

(3) Do routine emission testing on production vehicles or engines (see subpart D of this part).

(4) Follow our instructions throughout this part.

(c) Subpart F of this part and parts 86 and 1065 describe how you must test your vehicles or engines. Subpart F of this part describes when you may test the engine alone instead of the entire vehicle.

(d) Subpart G of this part and part 1068 describe requirements and prohibitions that apply to manufacturers, owners, operators, rebuilders, and all others. They also describe exemptions available for special circumstances.

§1051.015 Do any other regulation parts affect me?

(a) Parts 86 and 1065 of this chapter describe procedures and equipment specifications for testing vehicles and engines. Subpart F of this part describes how to apply part 86 or 1065 to show you meet the emission standards in this part.

(b) Part 1068 of this chapter describes general provisions, including these seven areas:

(1) Prohibited acts and penalties for manufacturers and others.

(2) Rebuilding and other aftermarket changes.

(3) Exemptions for certain vehicles and engines.

(4) Importing vehicles and engines.
(5) Selective enforcement audits of your production.
(6) Defect reporting and recall.
(7) Procedures for public hearings.

(c) Other parts of this chapter affect you if referenced in this part.

§1051.020 May I certify a recreational engine instead of the vehicle?

(a) You may certify engines sold separately from vehicles in either of two cases:.

(1) If you manufacture recreational engines but not recreational vehicles, you may ask to certify the engine alone. In your request, explain why you cannot certify the entire vehicle.

(2) If you manufacture complete recreational vehicles containing engines you also sell separately, you may ask to certify all these engines in a single engine family or in separate engine families.

(b) If you certify an engine under this section, you must use the test procedures in subpart F of this part. If the test procedures require chassis testing, use good engineering judgment to install the engine in an appropriate vehicle for measuring emissions.

(c) If we allow you to certify recreational engines, we may tell you how to ensure the engine will comply with emission standards after it is in a vehicle. If we do not tell you what to do, use good engineering judgment to ensure that the engine will meet standards after installation. You must comply with §1051.130.

(d) Do not use the provisions of this section to circumvent or reduce the stringency of this part's standards or other requirements.

Subpart B—Emission standards and related requirements

§1051.100 What exhaust emission standards must my vehicles meet?

(a) For snowmobiles, see §1051.101.
(b) For off-highway motorcycles, see §1051.102.
(c) For all-terrain vehicles, see §1051.103.
(d) Apply this subpart to all testing, including production-line and in-use testing, as described in subparts D and E of this part.

§1051.101 What are the exhaust emission standards for snowmobiles?

(a) Apply the exhaust emission standards in this section by model year while measuring emissions with snowmobile test procedures in subpart F of this part.
(b) Follow Table 1 of this section for exhaust emission standards. You may use the averaging, banking, and trading provisions of subpart H of this part to show compliance with these standards. Table 1 also shows the maximum value you may specify for a Family Emission Limit.

Table 1 of §1051.101
Exhaust Emission Standards for Snowmobiles (g/kW-hr)

Phase	Model Year	Emission standards		Maximum allowable Family Emission Limits	
		HC	CO	HC	CO
Phase 1	2007 - 2009	100	275	150	400
Phase 2	2010 and later	75	200	150	400

(c) You may also follow the voluntary standards in Table 2 of this section while measuring emissions with the test procedures in subpart F of this part. If you certify snowmobiles under this paragraph, you must meet the emission standards and all testing and reporting requirements.

Table 2 of §1051.101
Voluntary Exhaust Emission
Standards for Snowmobiles (g/kW-hr)

Model Year	Emission standards	
	HC	CO
2002-2009	75	200
2002 and later	45	120

(d) Apply the exhaust emission standards in this section for snowmobiles using all fuels. You must meet the numerical emission standards for hydrocarbons in this section based on the following types of hydrocarbon emissions for snowmobiles powered by the following fuels:
(1) Gasoline- and LPG-fueled snowmobiles: THC emissions.
(2) Natural gas-fueled snowmobiles: NMHC emissions.
(3) Alcohol-fueled snowmobiles: THCE emissions.
(e) You must show in your certification application that your snowmobiles meet emission standards over their full useful life. The minimum useful life is 300 hours of operation or five years, whichever comes first. Specify a longer useful life under either of two conditions:

(1) If you design, advertise, or market your snowmobile to operate longer than the minimum useful life (your recommended time until rebuild may indicate a longer design life).

(2) If your basic mechanical warranty is longer than the minimum useful life.

(f) Refer to §1051.240 to apply deterioration factors.

§1051.102 What are the exhaust emission standards for off-highway motorcycles?

(a) Apply the exhaust emission standards in this section by model year while measuring emissions with off-highway motorcycle test procedures in subpart F of this part.

(b) Follow Table 1 of this section for exhaust emission standards. You may use the averaging, banking, and trading provisions of subpart H of this part to show compliance with these HC+NOx standards. The phase-in percentages in the table specify the percentage of your production that must comply with the emission standards for those model years.

Table 1 of §1051.102
Exhaust Emission Standards
for Off-Highway Motorcycles (g/km)

Model Year	Phase-in	Emission standards		Maximum allowable Family Emission Limits
		HC+NOx	CO	HC+NOx
2006	50%	2.0	25.0	20.0
2007 and later	100%	2.0	25.0	20.0

(c) You may also follow the voluntary standards in Table 2 of this section while measuring emissions with the test procedures in subpart F of this part. If you certify off-highway motorcycles under this paragraph, you must meet the emission standards and all testing and reporting requirements.

Table 2 of §1051.102
Voluntary Exhaust Emission
Standards for Off-Highway Motorcycles(g/km)

Model Year	Emission standards	
	HC+NOx	CO
2002 and later	0.8	15

(d) Apply the exhaust emission standards in this section for off-highway motorcycles using all fuels. You must meet the numerical emission standards for hydrocarbons in this section based on the following types of hydrocarbon emissions for off-highway motorcycles powered by the following fuels:

(1) Gasoline- and LPG-fueled off-highway motorcycles: THC emissions.

(2) Natural gas-fueled off-highway motorcycles: NMHC emissions.

(3) Alcohol-fueled off-highway motorcycles: THCE emissions.

(e) You must show in your certification application that your off-highway motorcycles meet emission standards over their full useful life. The minimum useful life is 30,000 km or five years, whichever comes first. Specify a longer useful life under either of two conditions:

(1) If you design, advertise, or market your off-highway motorcycle to operate longer than the minimum useful life (your recommended time until rebuild may indicate a longer design life).

(2) If your basic mechanical warranty is longer than the minimum useful life.

(f) Refer to §1051.240 to apply deterioration factors.

§1051.103 What are the exhaust emission standards for all-terrain vehicles (ATVs)?

(a) Apply the exhaust emission standards in this section by model year while measuring emissions with ATV test procedures in subpart F of this part.

(b) Follow Table 1 of this section for exhaust emission standards. You may use the averaging, banking, and trading provisions of subpart H of this part to show compliance with these HC+NOx standards. Table 1 also shows the maximum value you may specify for a Family Emission Limit.

(1) The phase-in percentages in the table specify the percentage of your production that must comply with the emission standards for those model years.

(2) In the 2009 model year, you must produce the specified minimum percentage of Phase 2 vehicles, while certifying any remaining vehicles to Phase 1 standards.

Table 1 of §1051.103
Exhaust Emission Standards for ATVs (g/km)

Phase	Model Year	Phase-in	Emission standards		Maximum allowable Family Emission Limits
			HC+NOx	CO	HC+NOx
Phase 1	2006	50%	2.0	25.0	20.0
	2007 and 2008	100%			
	2009	50%			
Phase 2	2009	50%	1.0	25.0	2.0
	2010 and later	100%			

(c) You may also follow the voluntary standards in Table 2 of this section while measuring emissions with the test procedures in subpart F of this part. If you certify ATVs under this paragraph, you must meet the emission standards and all testing and reporting requirements.

Table 2 of §1051.103
Voluntary Exhaust Emission
Standards for ATVs (g/km)

Model Year	Emission standards	
	HC+NOx	CO
2002 and later	0.8	12

(d) Apply the exhaust emission standards in this section for ATVs using all fuels. You must meet the numerical emission standards for hydrocarbons in this section based on the following types of hydrocarbon emissions for ATVs powered by the following fuels:

(1) Gasoline- and LPG-fueled ATVs: THC emissions.

(2) Natural gas-fueled ATVs: NMHC emissions.

(3) Alcohol-fueled ATVs: THCE emissions.

(e) You must show in your certification application that your ATVs meet emission standards over their full useful life. The minimum useful life is 30,000 km or five years, whichever comes first. Specify a longer useful life under either of two conditions:

(1) If you design, advertise, or market your ATV to operate longer than the minimum useful life (your recommended time until rebuild may indicate a longer design life).

(2) If your basic mechanical warranty is longer than the minimum useful life.

(f) Refer to §1051.240 to apply deterioration factors.

§1051.115 What other requirements must my vehicles meet?

(a) Closed crankcase. Design and produce your vehicles so they release no crankcase emissions into the atmosphere.

(b) Emission sampling capability. Produce all your vehicles to allow sampling of exhaust emissions in the field. This sampling requires either exhaust ports downstream of any aftertreatment devices or the ability to extend the exhaust pipe by 20 cm. This is necessary to minimize any diluting effect from ambient air at the end of the exhaust pipe.

(c) Adjustable parameters. If your vehicles have adjustable parameters, make sure they meet all the requirements of this part for any adjustment in the physically available range.

(1) We do not consider an operating parameter adjustable if you permanently seal it or if ordinary tools cannot readily access it.

(2) We may require you to adjust the engine to any specification within the adjustable range during certification testing, production-line testing, selective enforcement auditing, or in-use testing.

(d) Other adjustments. This provision applies if an experienced mechanic can change your engine's air-fuel ratio in less than one hour with a few parts whose total cost is under $50 (in 2001 dollars). An example is carburetor jets. In this case, your vehicle must meet all the requirements of this part for any air/fuel ratio within the adjustable range described in paragraph (d)(1) of this section.

(1) In your application for certification, specify the adjustable range of air/fuel ratios you expect to occur in use. You may specify it in terms of engine parts (such as the carburetor jet's size). This adjustable range must include all air/fuel ratios between the lean limit and the rich limit, unless you can show that some air/fuel ratios will not occur in use.

(i) The lean limit is the air/fuel ratio that produces the highest engine power output (averaged over the test cycle).

(ii) The rich limit is the richest of the following air/fuel ratios:

(A) The air/fuel ratio when you produce it.

(B) The air/fuel ratio when you do durability testing.

(C) The richest air-fuel ratio that you recommend to your customers.

(2) We may require you to adjust the engine to any specification within the adjustable range during certification testing, production-line testing, selective enforcement auditing, or in-use testing.

(e) Prohibited controls. You may not design engines with an emission-control system that emits any noxious or toxic substance that the engine would not emit during operation in the absence of such a system, except as specifically permitted by regulation.

(f) Defeat devices. You may not equip your vehicles with a defeat device. A defeat device is an auxiliary emission-control device or other control feature that reduces the effectiveness of emission controls under conditions you may reasonably expect the vehicle to encounter during normal operation and use. This does not apply to auxiliary emission-control devices you identify in your certification application if any of the following is true:

(1) The conditions of concern were substantially included in your prescribed duty cycles.

(2) You show your design is necessary to prevent catastrophic vehicle damage or accidents.

(3) The reduced effectiveness applies only to starting the engine.

(g) Noise standards. See 40 CFR Chapter I, Subchapter G to determine if your vehicle must meet noise emission standards.

§1051.120 What warranty requirements apply to me?

(a) You must warrant to the ultimate buyer that the new vehicle meets two conditions:

(1) You have designed, built, and equipped it to meet the requirements of this part.

(2) It is free from defects in materials and workmanship that may keep it from meeting these requirements.

(b) Your emission-related warranty must be valid for at least 50 percent of the vehicle's useful life in kilometers (or hours) of operation or at least three years, whichever comes first. You may offer a warranty more generous than we require. This warranty may not be shorter than any published or negotiated warranty you offer for the vehicle or any of its components. If a vehicle has no tamper-proof odometer (or hour meter), we base warranty periods in this paragraph only on the vehicle's age (in years).

(c) Your emission-related warranty must cover components whose failure would increase a vehicle's emissions, including electronic controls, fuel injection, exhaust-gas recirculation, aftertreatment, or any other system you develop to control emissions. In general, we consider replacing or repairing other components to be the owner's responsibility.
(d) You may exclude from your warranty a component named in paragraph (c) of this section, if it meets two conditions:
(1) It was in general use on similar vehicles before January 1, 2000.
(2) Its failure would clearly degrade the vehicle's performance enough that the operator would need to repair or replace it.
(e) You may limit your emission-related warranty's validity to properly maintained vehicles, as described in §1068.115 of this chapter.
(f) If you make an aftermarket part, you may—but do not have to—certify that using the part will still allow vehicles to meet emission standards, as described in §85.2114 of this chapter.

§1051.125 What maintenance instructions must I give to buyers?
Give the ultimate buyer of each new vehicle written instructions for properly maintaining and using the vehicle, including the emission-control system. The maintenance instructions also apply to service accumulation on your test vehicles or engines, as described in 40 CFR part 1065, subpart E.
(a) Critical emission-related maintenance. You may schedule critical maintenance on particular devices if you meet the following conditions:
(1) You may ask us to approve maintenance on air-injection, fuel-system, or ignition components, aftertreatment devices, exhaust gas recirculation systems, crankcase ventilation valves, or oxygen sensors only if it meets two criteria:
(i) Operators are reasonably likely to do the maintenance you call for.
(ii) Vehicles need the maintenance to meet emission standards.
(2) We will accept scheduled maintenance as reasonably likely to occur in use if you satisfy any of four conditions:
(i) You present data showing that, if a lack of maintenance increases emissions, it also unacceptably degrades the vehicle's performance.
(ii) You present survey data showing that 80 percent of vehicles in the field get the maintenance you specify at the recommended intervals.
(iii) You provide the maintenance free of charge and clearly say so in maintenance instructions for the customer.
(iv) You otherwise show us that the maintenance is reasonably likely to be done at the recommended intervals.
(b) Minimum maintenance intervals. You may not schedule emission-related maintenance within the minimum useful life period for aftertreatment devices, fuel injectors, sensors, electronic control units, and turbochargers.
(c) Noncritical emission-related maintenance. For engine parts not listed in paragraph (a) or (b) of this section, you may recommend any additional amount of inspection or maintenance. But you must state clearly that these steps are not necessary to keep the emission-related warranty valid. Also, do not take these inspection or maintenance steps during service accumulation on your test vehicles or engines.
(d) Source of parts and repairs. Print clearly on the first page of your written maintenance instructions that any repair shop or person may maintain, replace, or repair emission-control devices and systems. Make sure your instructions require no component or service identified by brand, trade, or corporate name. Also, do not directly or indirectly distinguish between service by companies with which you have a commercial relationship and service by independent repair shops or the owner. You may disregard this paragraph's requirements if you do one of two things:
(1) Provide a component or service without charge under the purchase agreement.
(2) Get us to waive this prohibition in the public's interest by convincing us the vehicle will work properly only with the identified component or service.

§1051.130 What installation instructions must I give to vehicle manufacturers?

(a) If you sell an engine for someone else to install in a recreational vehicle, give the buyer of the vehicle written instructions for installing it consistent with the requirements of this part. Make sure these instructions have the following information:

(1) Include the heading: "Emission-related installation instructions."

(2) State: "Failing to follow these instructions when installing a certified engine in a recreational vehicle violates federal law (40 CFR 1068.105(b)), subject to fines or other penalties as described in the Clean Air Act."

(3) Describe any other instructions needed to install an exhaust aftertreatment device consistent with your application for certification.

(4) Describe any limits on the range of applications needed to ensure that the engine operates consistently with your application for certification. For example, if your engines are certified only to the snowmobile standards, tell vehicle manufacturers not to install the engines in other vehicles.

(5) Describe any other instructions to make sure the installed engine will operate according to any design specifications you describe in your application for certification.

(6) State: "If you obscure the engine's emission label, you must attach a duplicate label to your vehicle, as described in 40 CFR 1068.105."

(b) You do not need installation instructions for engines you install in your own vehicle.

§1051.135 How must I label and identify the vehicles and engines I produce?

(a) Assign each production engine a unique identification number and permanently and legibly affix or engrave it on the engine.

(b) At the time of manufacture, add a permanent label identifying each engine. To meet labeling requirements, do four things:

(1) Attach the label in one piece so it is not removable without being destroyed or defaced.

(2) Design and produce it to be durable and readable for the engine's entire life.

(3) Secure it to a part of the engine needed for normal operation and not normally requiring replacement.

(4) Write it in block letters in English.

(c) On your engine label, do 13 things:

(1) Include the heading "EMISSION CONTROL INFORMATION."

(2) Include your full corporate name and trademark.

(3) State: "THIS VEHICLE IS CERTIFIED TO OPERATE ON [specify operating fuel or fuels]."

(4) Identify the emission-control system; your identifiers must use names and abbreviations consistent with SAE J1930, which we incorporate by reference (see §1051.810).

(5) List all requirements for fuel and lubricants.

(6) State the date of manufacture [DAY (optional), MONTH, and YEAR]; if you stamp it on the engine and print it in the owner's manual, you may omit this information from the label.

(7) State: "THIS VEHICLE MEETS U.S. ENVIRONMENTAL PROTECTION AGENCY REGULATIONS FOR [MODEL YEAR] [SNOWMOBILES or OFF-ROAD MOTORCYCLES or ATVS]."

(8) Include EPA's standardized designation for the engine family.

(9) State the engine's displacement (in liters) and rated power.

(10) State the engine's useful life (see §1051.100(h).

(11) List specifications and adjustments for engine tuneups; show the proper position for the transmission during tuneup and state which accessories should be operating.

(12) Describe other information on proper maintenance and use.

(13) Identify the emission standards or Family Emission Limits to which you have certified the engine.

(d) Some of your engines may need more information on the label. If you produce an engine or vehicle that we exempt from the requirements of this part, see 40 CFR part 1068, subparts C and D, for more label information.

(e) Some engines may not have enough space for a label with all the required information. In this case, you may omit the information required in paragraphs (c)(3), (c)(4), (c)(5), and (c)(12) of this section if you print it in the owner's manual instead.

(f) If you are unable to meet these labeling requirements, you may ask us to modify them consistent with the intent

of this section.
(g) If you obscure the engine label while installing the engine in the vehicle, you must place a duplicate label on the vehicle. If someone else installs the engine in a vehicle, give them duplicate labels if they ask for them (see §1068.105).

§1051.145 What provisions apply only for a limited time?
Apply the following provisions instead of others in this part for the periods and circumstances specified in this section.
(a) Provisions for small-volume manufacturers. Special provisions apply to you if you are a small-volume manufacturer subject to the requirements of this part.
(1) You may delay complying with otherwise applicable emission standards (and other requirements) for two model years.
(2) If you are a small-volume manufacturer of snowmobiles, at least 50 percent of the models you produce must meet emission standards in the first two years they apply, as described in paragraph (a)(1) of this section.
(3) Your vehicles for model years before 2011 may be exempt from the requirements and prohibitions of this part if you meet four criteria:
(i) Produce your vehicles by installing engines covered by a valid certificate of conformity under 40 CFR part 90 that shows the engines meet standards for Class II engines for each engine's model year.
(ii) Do not change the engine in a way that we could reasonably expect to increase its exhaust emissions.
(iii) Make sure the engine meets all applicable requirements from 40 CFR part 90. This applies to engine manufacturers, vehicle manufacturers who use these engines, and all other persons as if these engines were not used in recreational vehicles.
(iv) Make sure that fewer than 50 percent of the engine model's total sales, from all companies, are used in recreational vehicles regulated under this part.
(b) Optional emission standards for Phase 1 ATVs. To meet Phase 1 ATV standards, you may apply the exhaust emission standards by model year in paragraph (b)(1) of this section while measuring emissions using the engine-based test procedures in 40 CFR part 1065 instead of the chassis-based test procedures in 40 CFR part 86.
(1) Follow Table 1 of this section for exhaust emission standards, while meeting all the other requirements of 1051.103. You may use emission credits to show compliance with these standards (see subpart H of this part). You may not exchange emission credits with engine families meeting the standards in §1051.103. You may also not exchange credits between engine families certified above 225 cc and engine families certified below 225 cc.
(i) The phase-in percentages in the table specify the percentage of your production that must comply with the emission standards for those model years.
(ii) In the 2009 model year, you may produce fewer vehicles meeting Phase 1 standards if they are instead certified to Phase 2 standards.

Table 1 of §1051.145
Optional Exhaust Emission Standards for Phase 1 ATVs (g/kW-hr)

Engine Displacement	Model Year	Phase-in	Emission standards		Maximum allowable Family Emission Limits
			HC+NOx	CO	HC+NOx
<225 cc	2006	50%	16.1	400	32.2
	2007 and 2008	100%			
	2009	50%			
≥225 cc	2006	50%	13.4	400	26.8
	2007 and 2008	100%			
	2009	50%			

(2) Measure emissions by testing the engine on a dynamometer with the steady-state duty cycle described in Table 2 of this section.

(i) During idle mode, hold the speed within your specifications, keep the throttle fully closed, and keep engine torque under 5 percent of the peak torque value at maximum test speed.

(ii) For the full-load operating mode, operate the engine at its maximum fueling rate.

(iii) See part 1065 of this chapter for detailed specifications of tolerances and calculations.

Table 2 of §1051.145
6-Mode Duty Cycle for Recreational Engines

Mode Number	Engine Speed	Torque	Minimum Time in mode (minutes)	Weighting Factors
1	85	100	5.0	0.09
2	85	75	5.0	0.20
3	85	50	5.0	0.29
4	85	25	5.0	0.30
5	85	10	5.0	0.07
6	Idle	0	5.0	0.05

(c) For model years before 2011, if you are a small-volume manufacturer, your vehicles may be exempt from the requirements and prohibitions of this part if you meet all the following criteria:

(1) You must produce them by installing engines covered by a valid certificate of conformity under 40 CFR part 90 showing that the engines meet the standards for Class II engines for each engine's model year.

(2) You must not make any changes to the engine that we could reasonably expect to increase its exhaust emissions.

(3) You must make sure the engine meets all the requirements from 40 CFR part 90 that apply. The requirements and restrictions of 40 CFR part 90 apply to anyone manufacturing these engines, anyone manufacturing vehicles that use these engines, and all other persons in the same manner as if these engines were not used in recreational vehicles.

(4) You must make sure that fewer than 50 percent of the engine model's total sales, from all companies, are used in recreational vehicles.

Subpart C—Certifying engine families

§1051.201 What are the general requirements for submitting a certification application?
(a) Send us an application for a certificate of conformity for each engine family. Each application is valid for only one model year.
(b) The application must not include false or incomplete statements or information (see §1051.250).
(c)We may choose to ask you to send us less information than we specify in this subpart, but this would not change your recordkeeping requirements.
(d) Use good engineering judgment for all decisions related to your application (see §1068.005 of this chapter).
(e) An authorized representative of your company must approve and sign the application.

§1051.205 How must I prepare my application?
In your application, you must do all the following things:
(a) Describe the engine family's specifications and other basic parameters of the vehicle design. List the types of fuel you intend to use to certify the engine family (for example, gasoline, liquefied petroleum gas, methanol, or natural gas).
(b) Explain how the emission-control system operates. Describe in detail all the system's components, auxiliary emission-control devices, and all fuel-system components you will install on any production or test vehicle or engine. Explain why any auxiliary emission-control devices are not defeat devices (see §1051.115(f)). Do not include detailed calibrations for components unless we ask for them.
(c) Describe the vehicles or engines you selected for testing and the reasons for selecting them.
(d) Describe any special or alternate test procedures you used (see §1051.501).
(e) Identify the duty cycle and the number of engine operating hours used to stabilize emission levels. Describe any scheduled maintenance you did.
(f) List the specifications of the test fuel to show that it falls within the required ranges we specify in 40 CFR part 1065, subpart C.
(g) Identify the engine family's useful life.
(h) Propose maintenance and use instructions for the ultimate buyer of each new vehicle (see §1051.125).
(i) Propose emission-related installation instructions if you sell engines for someone else to install in a vehicle (see §1051.130).
(j) Propose an emission-control label.
(k) Present emission data for HC, NOx (where applicable), and CO on a test vehicle or engine to show your vehicles meet the emission standards we specify in subpart B of this part. Show these figures before and after applying deterioration factors for each vehicle or engine. Include test data for each type of fuel on which you intend for vehicles in the engine family to operate (for example, gasoline, liquefied petroleum gas, methanol, or natural gas).
(l) Report all test results, including those from invalid tests or from any nonstandard tests (such as measurements based on exhaust concentrations in parts per million).
(m) Identify the engine family's deterioration factors and describe how you developed them. Present any emission test data you used for this.
(n) Describe all adjustable operating parameters and other adjustments (see §1051.115 (c) and (d)), including the following:
(1) The nominal or recommended setting and the associated production tolerances.
(2) The intended physically adjustable range.
(3) The limits or stops used to establish adjustable ranges.
(4) Production tolerances of the limits or stops used to establish each physically adjustable range.
(5) Where applicable, information showing that someone cannot readily modify the engines to operate outside the physically adjustable range.
(6) The air/fuel ratios specified in §1051.115(d).
(o) State that you operated your test vehicles or engines according to the specified procedures and test parameters using the fuels described in the application to show you meet the requirements of this part.

(p) State unconditionally that all the vehicles (and/or engines) in the engine family comply with the requirements of this part, other referenced parts, and the Clean Air Act.
(q) Include estimates of vehicle production.
(r) Add other information to help us evaluate your application if we ask for it.

§1051.210 May I get preliminary approval before I complete my application?
If you send us information before you finish the application, we will review it and make any appropriate determinations listed in §1051.215(b) within 90 days of your request. If we need to ask you for further information, we will extend the 90-day period by the number of days we wait for your response.

§1051.215 What happens after I complete my application?
(a) If any of the information in your application changes after you submit it, amend it as described in §1051.225.
(b) We may decide that we cannot approve your application unless you revise it.
(1) If you inappropriately use the provisions of §1051.230(c) or (d) to define a broader or narrower engine family, we will require you to redefine your engine family.
(2) If we determine your selected useful life for the engine family is too short, we will require you to lengthen it (see §1051.101(e), §1051.102(e), or §1051.103(e)).
(3) If we determine your deterioration factors are not appropriate, we will require you to revise them (see §1051.240(c)).
(4) If your proposed label is inconsistent with §1051.135, we will require you to change it (and tell you how, if possible).
(5) If you require or recommend maintenance and use instructions inconsistent with §1051.125, we will require you to change them.
(6) If we find any other problem with your application, we will tell you how to correct it.
(c) If we determine your application is complete and shows you meet all the requirements, we will issue a certificate of conformity for your engine family for that model year. If we deny the application, we will explain why in writing. You may then ask us to hold a hearing to reconsider our decision (see §1051.820).

§1051.220 How do I amend the maintenance instructions in my application?
Send the Designated Officer a request to amend your application for certification for an engine family if you want to change the maintenance instructions in a way that could affect emissions. In your request, describe the proposed changes to the maintenance instructions. Unless we disapprove it, you may distribute the new maintenance instructions to your customers 30 days after we receive your request. We may also approve a shorter time or waive this requirement.

§1051.225 How do I amend my application to include new or modified vehicles?
(a) You must amend your application for certification before you take either of the following actions:
(1) Add a vehicle to a certificate of conformity.
(2) Make a design change for a certified engine family that may affect emissions or an emission-related part over the vehicle's lifetime.
(b) Send the Designated Officer a request to amend the application for certification for an engine family. In your request, do all of the following:
(1) Describe the vehicle model or configuration you are adding or changing.
(2) Include engineering evaluations or reasons why the original test vehicle or engine is or is not still appropriate.
(3) If the original test vehicle or engine for the engine family is not appropriate to show compliance for the new or modified vehicle, include new test data showing that the new or modified vehicle meets the requirements of this part
(c) You may start producing the new or modified vehicle anytime after you send us your request.
(d) You must give us test data within 30 days if we ask for more testing, or stop producing the vehicle if you are not able do this.
(e) If we determine that the certificate of conformity would not cover your new or modified vehicle, we will send

you a written explanation of our decision. In this case, you may no longer produce these vehicles, though you may ask for a hearing for us to reconsider our decision (see §1051.820).

§1051.230 How do I select engine families?

(a) Divide your product line into families of vehicles that you expect to have similar emission characteristics. Your engine family is limited to a single model year.

(b) Group vehicles in the same engine family if they are identical in all of the following aspects:

(1) The combustion cycle.

(2) The cooling system (water-cooled vs. air-cooled)

(3) The number and arrangement of cylinders.

(4) The number, location, volume, and composition of catalytic converters.

(5) Method of air aspiration.

(6) Bore and stroke.

(7) Configuration of the combustion chamber.

(8) Location of intake and exhaust valves or ports.

(c) In some cases you may subdivide a group of vehicles that is identical under paragraph (b) of this section into different engine families. To do so, you must show you expect emission characteristics to be different during the useful life or that any of the following engine characteristics are different:

(1) Method of actuating intake and exhaust timing (poppet valve, reed valve, rotary valve, etc.).

(2) Sizes of intake and exhaust valves or ports.

(3) Type of fuel.

(4) Configuration of the fuel system.

(5) Exhaust system.

(d) In some cases, you may include different engines in the same engine family, even though they are not identical with respect to the things listed in paragraph (b).

(1) If you show that different engines have similar emission characteristics during the useful life, we may approve grouping them in the same engine family.

(2) If you are a small-volume manufacturer, you may group engines from any vehicles subject to the same emission standards into a single engine family. This does not change any of the requirements of this part for showing that an engine family meets emission standards.

(e) If you cannot define engine families by the method in this section, we will define them based on features related to emission characteristics.

§1051.235 How does testing fit with my application for a certificate of conformity?

(a) Test your vehicles or engines using the procedures and equipment specified in subpart F of this part.

(b) Select from each engine family a test vehicle or engine for each fuel type with a configuration you believe is most likely to exceed the emission standards. Using good engineering judgment, consider the emission levels of all exhaust constituents over the full useful life of the vehicle.

(c) You may submit emission data for equivalent engine families from previous years instead of doing new tests, but only if the data shows that the test vehicle or engine would meet all the requirements for the latest vehicle or engine models. We may require you to do new emission testing if we believe the latest vehicle or engine models could be substantially different from the previously tested vehicle or engine.

(d) We may choose to measure emissions from any of your test vehicles or engines.

(1) If we do this, you must provide the test vehicle or engine at the location we select. We may decide to do the testing at your plant or any other facility. If we choose to do the testing at your plant, you must schedule it as soon as possible and make available the instruments and equipment we need.

(2) If we measure emissions on one of your test vehicles or engines, the results of that testing become the official data for the vehicle or engine. Unless we later invalidate this data, we may decide not to consider your data in determining if your engine family meets the emission standards.

(3) Before we test one of your vehicles or engines, we may set its adjustable parameters to any point within the physically adjustable ranges (see §1051.115(c)) we may also adjust the air/fuel ratio within the adjustable range specified in §1051.115(d).

(4) Calibrate the test vehicle or engine within the production tolerances shown on the engine label for anything we do not consider an adjustable parameter (see §1051.205(m)).

(e) If you are a small-volume manufacturer, you may certify by design on the basis of existing emission data from comparable vehicles, in accordance with good engineering judgment. In those cases, you are not required to test your vehicles.

§1051.240 How do I determine if my engine family complies with emission standards?

(a) Your engine family complies with the numerical emission standards in subpart B if all emission-data vehicles representing that family have test results showing emission levels at or below the standards.

(b) Your engine family does not comply if any emission-data vehicle representing that family has test results showing emission levels above the standards for any pollutant.

(c) To compare emission levels from the emission-data vehicle with the emission standards, apply deterioration factors (to three decimal places) to the measured emission levels. The deterioration factor is a number that shows the relationship between exhaust emissions at the end of useful life and at the low-hour test point. Section 1051.520 specifies how to test your vehicle to develop deterioration factors that estimate the change in emissions over your vehicle's full useful life. Small-volume manufacturers may use assigned deterioration factors established by EPA. Apply the deterioration factors as follows:

(1) For vehicles that use aftertreatment technology, such as catalytic converters, the deterioration factor is the ratio of exhaust emissions at the end of useful life to exhaust emissions at the low-hour test point. Adjust the official emission results for each tested vehicle at the selected test point by multiplying the measured emissions by the deterioration factor. If the factor is less than one, use one.

(2) For vehicles that do not use aftertreatment technology, the deterioration factor is the difference between exhaust emissions at the end of useful life and exhaust emissions at the low-hour test point. Adjust the official emission results for each tested vehicle at the selected test point by adding the factor to the measured emissions. If the factor is less than zero, use zero.

(d) After adjusting the emission levels for deterioration, round them to the same number of decimal places as the standard. Compare the rounded emission levels to the emission standard for each test vehicle.

§1051.245 What records must I keep and make available to EPA?

(a) Organize and maintain the following records to keep them readily available; we may review these records at any time:

(1) A copy of all applications and any summary information you sent us.

(2) Any of the information we specify in §1051.205 that you did not include in your application.

(3) A detailed history of each emission-data vehicle. In each history, describe all of the following:

(i) The emission-data vehicle's construction, including its origin and buildup, steps you took to ensure that it represents production vehicles, any components you built specially for it, and all emission-related components.

(ii) How you accumulated vehicle or engine operating hours, including the dates and the number of hours accumulated.

(iii) All maintenance (including modifications, parts changes, and other service) and the dates and reasons for the maintenance.

(iv) All your emission tests, including documentation on routine and standard tests, as specified in part 1065 of this chapter, and the date and purpose of each test.

(v) All tests to diagnose engine or emission-control performance, giving the date and time of each and the reasons for the test.

(vi) Any other significant events.

(b) Keep data from routine emission tests (such as test cell temperatures and relative humidity readings) for one year after we issue the associated certificate of conformity. Keep all other information specified in paragraph (a) of this section for eight years after we issue your certificate.

(c) Store these records in any format and on any media, as long as you can promptly send us organized, written records in English if we ask for them.

(d) Send us copies of any maintenance instructions or explanations if we ask for them.

§1051.250 When may EPA deny, revoke, or void my certificate of conformity?

(a) We may deny your application for certification if your emission-data vehicles fail to comply with emission standards or other requirements. Our decision may be based on any information available to us. If we deny your application, we will explain why in writing.

(b) In addition, we may deny your application or revoke your certificate if you do any of the following:

(1) Refuse to comply with any testing or reporting requirements.

(2) Submit false or incomplete information (paragraph (d) of this section applies if this is fraudulent).

(3) Render inaccurate any test data.

(4) Deny us from completing authorized activities despite our presenting a warrant or court order (see §1068.020 of this chapter).

(5) Produce vehicle or engines for importation into the United States at a location where local law prohibits us from carrying out authorized activities.

(c) We may void your certificate if you do not keep the records we require or do not give us information when we ask for it.

(d) We may void your certificate if we find that you committed fraud to get it. This means intentionally submitting false or incomplete information.

(e) If we deny your application or revoke or void your certificate, you may ask for a hearing (see §1051.820). Any such hearing will be limited to substantial and factual issues.

Subpart D—Testing production-line engines

§1051.301 When must I test my production-line vehicles or engines?

(a) If you certify vehicles to the standards of this part, you must test them as described in this subpart. If your vehicle is certified to g/kW-hr standards, then test the engine; otherwise, test the vehicle. The provisions of this subpart do not apply to small-volume manufacturers.

(b) We may suspend or revoke your certificate of conformity for certain engine families if your production-line vehicles or engines do not meet emission standards or you do not fulfill your obligations under this subpart (see §§1051.325 and 1051.340).

(c) The requirements of this part do not affect our ability to do selective enforcement audits, as described in part 1068 of this chapter.

(d) You may ask to use an alternate program for testing production-line vehicles or engines. In your request, you must show us that the alternate program gives equal assurance that your products meet the requirements of this part. If we approve your alternate program, we may waive some or all of this part's requirements.

(e) If you certify an engine family with carryover emission data, as described in §1051.235(c), and these equivalent engine families consistently meet the emission standards with production-line testing over the preceding two-year period, you may ask for a reduced testing rate for further production-line testing for that family. The minimum testing rate is one vehicle or engine per engine family. If we reduce your testing rate, we may limit our approval to a single model year.

(f) We may ask you to make a reasonable number of production-line vehicles or engines available for a reasonable time so we can test or inspect them for compliance with the requirements of this part.

§1051.305 How must I prepare and test my production-line vehicles or engines?

(a) Test procedures. Test the vehicles or engines using the applicable testing procedures in subpart F of this part to show you meet the emission standards in subpart B.

(b) Modifying a test vehicle or engine. Once a vehicle or engine is selected for testing (see §1051.310), you may adjust, repair, prepare, or modify it or check its emissions only if one of the following is true:

(1) You document the need for doing so in your procedures for assembling and inspecting all your production vehicles or engines and make the action routine for all the vehicles or engines in the engine family.

(2) This subpart otherwise specifically allows your action.

(3) We approve your action in advance.

(c) Malfunction. If a vehicle or engine malfunction prevents further emission testing, ask us to approve your decision to either repair it or delete it from the test sequence.

(d) Setting adjustable parameters. Before any test, we may adjust or require you to adjust any adjustable parameter to any setting within its physically adjustable range.

(1) We may adjust idle speed outside the physically adjustable range as needed until the vehicle or engine has stabilized emission levels (see paragraph (e) of this section). We may ask you for information needed to establish an alternate minimum idle speed.

(2) We may make or specify adjustments within the physically adjustable range by considering their effect on emission levels, as well as how likely it is someone will make such an adjustment with in-use vehicles.

(e) Stabilizing emission levels. Before you test production-line vehicles or engines, you may operate the vehicle or engine to stabilize the emission levels. Using good engineering judgment, operate your vehicles or engines in a way that represents the way they will be used. You may operate each vehicle or engine for no more than the greater of two periods:

(1) 50 hours.

(2) The number of hours you operated your emission-data vehicle for certifying the engine family (see 40 CFR part 1065, subpart E).

(f) Damage during shipment. If shipping a vehicle or engine to a remote facility for production-line testing makes necessary an adjustment or repair, you must wait until after the after the initial emission test to do this work. We may waive this requirement if the test would be impossible or unsafe, or if it would permanently damage the vehicle or engine. Report to us, in your written report under §1051.345, all adjustments or repairs you make on test vehicles

or engines before each test.
(g) Retesting after invalid tests. You may retest a vehicle or engine if you determine an emission test is invalid. Explain in your written report reasons for invalidating any test and the emission results from all tests. If you retest a vehicle or engine and, within ten days after testing, ask to substitute results of the new tests for the original ones, we will answer within ten days after we receive your information.

§1051.310 How must I select vehicles or engines for production-line testing?
(a) Use test results from two vehicles or engines for each engine family to calculate the required sample size for the model year. Update this calculation with each test.
(1) For engine families with projected annual sales of at least 1600, the test periods are consecutive quarters (3 months).
(2) For engine families with projected annual sales below 1600, the test period is the whole model year.
(b) Early in each test period, randomly select and test an engine from the end of the assembly line for each engine family.
(1) In the first test period for newly certified engines, randomly select and test one more engine. Then, calculate the required sample size for the test period as described in paragraph (c) of this section.
(2) In later test periods or for engine families relying on previously submitted test data, combine the new test result with the last test result from the previous test period. Then, calculate the required sample size for the new test period as described in paragraph (c) of this section.
(c) Calculate the required sample size for each engine family. Separately calculate this figure for HC, NOx (or HC+NOx), and CO. The required sample size is the greater of these calculated values. Use the following equation:

$$N = \left[\frac{(t_{95} \times \sigma)}{(x - STD)}\right]^2 + 1$$

Where:
N = required sample size for the model year.
t_{95} = 95% confidence coefficient, which depends on the number of tests completed, n, as specified in the table in paragraph (c)(1) of this section. It defines 95% confidence intervals for a one-tail distribution.
x = mean of emission test results of the sample
STD = emission standard.
σ = test sample standard deviation (see paragraph (c)(2) of this section).

(1) Determine the 95% confidence coefficient, t_{95}, from the following table:

n	t_{95}	n	t_{95}	n	t_{95}
2	6.31	12	1.80	22	1.72
3	2.92	13	1.78	23	1.72
4	2.35	14	1.77	24	1.71
5	2.13	15	1.76	25	1.71
6	2.02	16	1.75	26	1.71
7	1.94	17	1.75	27	1.71
8	1.90	18	1.74	28	1.70
9	1.86	19	1.73	29	1.70
10	1.83	20	1.73	30	1.70
11	1.81	21	1.72	∞	1.645

(2) Calculate the standard deviation, σ, for the test sample using the following formula:

$$\sigma = \sqrt{\frac{\sum (X_i - x)^2}{n - 1}}$$

Where:

X_i = emission test result for an individual vehicle or engine

n = The number of tests completed in an engine family.

(d) Use final deteriorated test results to calculate the variables in this equation (see §1051.315(a)).

(e) After each new test, recalculate the required sample size using the updated mean values, standard deviations, and the appropriate 95% confidence coefficient.

(f) Distribute the remaining vehicle or engine tests evenly throughout the rest of the test period. You may need to adjust your schedule for selecting vehicles or engines if the required sample size changes. Continue to randomly select vehicles or engines from each engine family; this may involve testing vehicles or engines that operate on different fuels.

(g) Continue testing any engine family for which the sample mean, x, is greater than the emission standard. This applies if the sample mean for either HC, NOx (or HC+NOx) or for CO is greater than the emission standard. Continue testing until one of the following things happens:

(1) The sample size, n, for an engine family is greater than the required sample size, N, and the sample mean, x, is less than or equal to the emission standard.

(2) The engine family does not comply according to §1051.325.

(3) You test 30 vehicles or engines from the engine family.

(4) You test one percent of your projected annual U.S.-directed production volume for the engine family.

(h) You may elect to test more randomly chosen vehicles or engines than we require. Include these vehicles or engines in the sample size calculations.

§1051.315 How do I know when my engine family does not comply?

(a) Calculate your test results. Round them to the number of decimal places in the emission standard expressed to one more decimal place.

(1) Initial and final test results. Calculate and round the test results for each vehicle or engine. If you do several tests on a vehicle or engine, calculate the initial test results, then add them together and divide by the number of tests and round for the final test results on that vehicle or engine.

(2) Final deteriorated test results. Apply the deterioration factor for the engine family to the final test results (see §1051.240(c)).

(b) Construct the following CumSum Equation for each engine family (for HC, NOx (or HC+NOx), and CO emissions):

$$C_i = C_{i-1} + X_i - (STD + F)$$

Where:

C_i = The current CumSum statistic.

C_{i-1} = The previous CumSum statistic. Prior to any testing, the CumSum statistic is 0 (i.e. $C_0 = 0$).

X_i = The current emission test result for an individual vehicle or engine.

STD = Emission standard.

F = $0.25 \times \sigma$.

(c) Use final deteriorated test results to calculate the variables in this equation (see §1051.315(a)).

(d) After each new test, recalculate the CumSum statistic.

(e) If you test more than the required number of vehicles or engines, include the results from these additional tests in the CumSum Equation.

(f) After each test, compare the current CumSum statistic, C_i, to the recalculated Action Limit, H, defined as $H = 5.0 \times \sigma$.

(g) If the CumSum statistic exceeds the Action Limit in two consecutive tests, the engine family does not comply with the requirements of this part. Tell us within ten working days if this happens.

(h) If you amend the application for certification for an engine family (see §1051.225), do not change any previous calculations of sample size or CumSum statistics for the model year.

§1051.320 What happens if one of my production-line vehicles or engines fails to meet emission standards?

(a) If you have a production-line vehicle or engine with final deteriorated test results exceeding one or more emission standards (see §1051.315(a)), the certificate of conformity is automatically suspended for that failing vehicle or engine. You must take the following actions before your certificate of conformity can cover that vehicle or engine:

(1) Correct the problem and retest the vehicle or engine to show it complies with all emission standards.

(2) Include in your written report a description of the test results and the remedy for each vehicle or engine (see §1051.345).

(b) You may at any time ask for a hearing to determine whether the tests and sampling methods were proper (see §1051.820).

§1051.325 What happens if an engine family does not comply?

(a) We may suspend your certificate of conformity for an engine family if it fails to comply under §1051.315. The suspension may apply to all facilities producing vehicles or engines from an engine family, even if you find noncompliant vehicles or engines only at one facility.

(b) We will tell you in writing if we suspend your certificate in whole or in part. We will not suspend a certificate until at least 15 days after the engine family became noncompliant. The suspension is effective when you receive

our notice.
(c) Up to 15 days after we suspend the certificate for an engine family, you may ask for a hearing to determine whether the tests and sampling methods were proper (see §1051.820). If we agree before a hearing that we used erroneous information in deciding to suspend the certificate, we will reinstate the certificate.

§1051.330 May I sell vehicles from an engine family with a suspended certificate of conformity?
You may sell vehicles that you produce after we suspend the engine family's certificate of conformity under §1048.315 only if one of the following occurs:
(a) You test each vehicle or engine you produce and show it complies with emission standards that apply.
(b) We conditionally reinstate the certificate for the engine family. We may do so if you agree to recall all the affected vehicles and remedy any noncompliance at no expense to the owner if later testing shows that the engine family still does not comply.

§1051.335 How do I ask EPA to reinstate my suspended certificate?
(a) Send us a written report in which you identify the reason for noncompliance, propose a remedy, and commit to a date for carrying it out. In your proposed remedy include any quality control measures you propose to keep the problem from happening again.
(b) Give us data from production-line testing that shows the remedied engine family complies with all the emission standards that apply.

§1051.340 When may EPA revoke my certificate under this subpart and how may I sell these vehicles again?
(a) We may revoke your certificate for an engine family in the following cases:
(1) You do not meet the reporting requirements.
(2) Your engine family fails to meet emission standards and your proposed remedy to address a suspended certificate under §1051.325 is inadequate to solve the problem or requires you to change the vehicle's design or emission-control system.
(b) To sell vehicles from an engine family with a revoked certificate of conformity, you must modify the engine family and then show it complies with the requirements of this part.
(1) If we determine your proposed design change may not control emissions for the vehicle's full useful life, we will tell you within five working days after receiving your report. In this case we will decide whether production-line testing will be enough for us to evaluate the change or whether you need to do more testing.
(2) Unless we require more testing, you may show compliance by testing production-line vehicles or engines as described in this subpart.
(3) We will issue a new or updated certificate of conformity when you have met these requirements.

§1051.345 What production-line testing records must I send to EPA?
(a) Within 30 calendar days of the end of each calendar quarter, send us a report with the following information:
(1) Describe any facility used to test production-line vehicles or engines and state its location.
(2) State the total U.S.-directed production volume and number of tests for each engine family.
(3) Describe how you randomly selected vehicles or engines.
(4) Describe your test vehicles or engines, including the engine family's identification and the vehicle's model year, build date, model number, identification number, and number of hours of operation before testing for each test vehicle or engine.
(5) Identify where you accumulated hours of operation on the vehicles or engines and describe the procedure and schedule you used.
(6) Provide the test number; the date, time and duration of testing; test procedure; initial test results before and after rounding; final test results; and final deteriorated test results for all tests. Provide the emission results for all measured pollutants. Include information for both valid and invalid tests and the reason for any invalidation.
(7) Describe completely and justify any nonroutine adjustment, modification, repair, preparation, maintenance, or test for the test vehicle or engine if you did not report it separately under this subpart. Include the results of any emission measurements, regardless of the procedure or type of vehicle.

(8) Provide the CumSum analysis required in §1051.315 for each engine family.
(9) Report on each failed vehicle or engine as described in §1051.320.
(10) State the date the calendar quarter ended for each engine family.

(b) We may ask you to add information to your written report, so we can determine whether your new vehicles conform with the requirements of this subpart.

(c) An authorized representative of your company must sign the following statement:

"We submit this report under Sections 208 and 213 of the Clean Air Act. Our production-line testing conformed completely with the requirements of 40 CFR part 1051. We have not changed production processes or quality-control procedures for the engine family in a way that might affect the emission control from production vehicles (or engines). All the information in this report is true and accurate, to the best of my knowledge. I know of the penalties for violating the Clean Air Act and the regulations." (Authorized Company Representative)

(d) Send electronic reports of production-line testing to the Designated Officer using an approved information format. If you want to use a different format, send us a written request with justification for a waiver.

(e) We will send copies of your reports to anyone from the public who asks for them. We will not release information about your sales or production volumes, which we will consider confidential under 40 CFR part 2.

§1051.350 What records must I keep?

(a) Organize and maintain your records as described in this section. We may review your records at any time, so it is important to keep required information readily available.

(b) Keep paper records of your production-line testing for one full year after you complete all the testing required for an engine family in a model year. You may use any additional storage formats or media if you like.

(c) Keep a copy of the written reports described in §1051.345.

(d) Keep the following additional records:

(1) A description of all test equipment for each test cell that you can use to test production-line vehicles or engines.
(2) The names of supervisors involved in each test.
(3) The name of anyone who authorizes adjusting, repairing, preparing, or modifying a test vehicle or engine and the names of all supervisors who oversee this work.
(4) If you shipped the vehicle or engine for testing, the date you shipped it, the associated storage or port facility, and the date the vehicle or engine arrived at the testing facility.
(5) Any records related to your production-line tests that are not in the written report.
(6) A brief description of any significant events during testing not otherwise described in the written report or in this section.

(e) If we ask, you must give us projected or actual production figures for an engine family. We may ask you to divide your production figures by power rating, displacement, fuel type, or assembly plant (if you produce vehicles or engines at more than one plant).

(f) Keep a list of vehicle or engine identification numbers for all the vehicles or engines you produce under each certificate of conformity. Give us this list within 30 days if we ask for it.

(g) We may ask you to keep or send other information necessary to implement this subpart.

Subpart E—Testing in-use engines

§1051.401 What provisions apply for in-use testing of my vehicles or engines?

We may conduct in-use testing of any vehicle or engine subject to the standards of this part. If we determine that a substantial number of vehicles or engines do not comply with the regulations of this part throughout their full useful life, we may order the manufacturer to conduct a recall as specified in 40 CFR part 1068.

Subpart F—Test Procedures

§1051.501 What procedures must I use to test my vehicles or engines?

(a) For snowmobiles, use the equipment and procedures for spark-ignition engines in part 1065 of this chapter to show your snowmobiles meet the duty-cycle emission standards in §1051.101. Measure HC, NOx, CO, and CO_2 emissions using the dilute sampling procedures in part 1065 of this chapter. Use the duty cycle in §1051.505.

(b) For motorcycles and ATVs, use the equipment, procedures, and duty cycle in subpart F of 40 CFR part 86 to show your vehicles meet the exhaust emission standards in §1051.102 or §1051.103. Measure HC, NOx, CO, and CO_2. If you certify ATVs using the interim testing provisions of 1051.145, use the equipment, procedures, and duty cycle described or referenced in that section. Motorcycles and ATVs with engine displacement at or below 169 cc must use the driving schedule in paragraph (c) of Appendix I to part 86. All others must use the driving schedule in paragraph (b) of Appendix I to part 86.

(c) Use the fuels and lubricants specified in 40 CFR part 1065, subpart C for all the testing and service accumulation we require in this part.

(d) You may use special or alternate procedures, as described in §1065.010 of this chapter.

(e) We may reject data you generate using alternate procedures if later testing with the procedures in part 1065 of this chapter shows contradictory emission data.

§1051.505 What special provisions apply for testing snowmobiles?

(a) Measure emissions by testing the engine on a dynamometer with the steady-state duty cycle described in Table 1 of this section.

(b) During idle mode, operate the engine with the following parameters:

(1) Hold the speed within your specifications.

(2) Keep the throttle fully closed.

(3) Keep engine torque under 5 percent of the peak torque value at maximum test speed.

(c) For the full-load operating mode, operate the engine at its maximum fueling rate.

(d) Keep the test engine's intake air between -15° C and -5° C (5° F and 23° F). Ambient temperatures during testing must be between -15° C and 30° C (5° F and 86° F).

(e) See part 1065 of this chapter for detailed specifications of tolerances and calculations.

Table 1 of §1051.505—5-mode Duty Cycle for Snowmobiles

Mode Number	Engine Speed	Torque	Minimum Time in mode (minutes)	Weighting Factors
1	100	100	5.0	0.12
2	85	51	5.0	0.27
3	75	33	5.0	0.25
4	65	19	5.0	0.31
5	Idle	0	5.0	0.05

§1051.520 How do I perform durability testing?

This section applies for durability testing to determine deterioration factors. A small-volume manufacturer may omit durability testing if it uses our assigned deterioration factors that we establish based on our projection of the likely deterioration in the performance of specific emission controls.

(a) Calculate your deterioration factor by testing a vehicles or engine that is representative of your engine family at a low-hour test point and the end of its useful life. You may also test at intermediate points.

(b) Operate the vehicle or engine over a representative duty cycle for a period at least as long as the useful life (in hours or kilometers). You may operate the vehicle or engine continuously.
(c) You may only perform the scheduled emission-related maintenance specified in §1051.125. You may not perform any unscheduled maintenance during durability testing unless we approve it in advance.
(d) Use a linear least-squares fit of your test data for each pollutant to calculate your deterioration factor.

Subpart G—Compliance provisions

§1051.601 What compliance provisions apply to these vehicles?
Engine and vehicle manufacturers, as well as owners, operators, and rebuilders of these vehicles, and all other persons, must observe the requirements and prohibitions in part 1068 of this chapter. The compliance provisions in this subpart apply only to the vehicles we regulate in this part.

§1051.605 What are the provisions for exempting vehicles from the requirements of this part if they use engines you have certified under the motor-vehicle program or the Large SI program?
(a) This section applies to you if you are the manufacturer of the engine. See §1051.610 if you are not the engine manufacturer.
(b) The only requirements or prohibitions from this part that apply to a vehicle that is exempt under this section are in this section and §1051.610.
(c) If you meet all the following criteria regarding your new vehicle, you are exempt under this section:
(1) You must produce it using an engine covered by a valid certificate of conformity under 40 CFR part 86 or 40 CFR part 1048.
(2) You must not make any changes to the certified engine that we could reasonably expect to increase its exhaust or evaporative emissions. For example, if you make any of the following changes to one of these engines, you do not qualify for this exemption:
(i) Change any fuel system or evaporative system parameters from the certified configuration (this does not apply to refueling emission controls).
(ii) Change any other emission-related components.
(iii) Modify or design the engine cooling system so that temperatures or heat rejection rates are outside the original engine's specified ranges.
(3) You must make sure the engine still has the label we require under 40 CFR part 86 or part 1048.
(4) You must make sure that fewer than 50 percent of the engine model’s total sales, from all companies, are used in recreational vehicles.
(d) If you produce both the engine and vehicle under this exemption, you must do all of the following to keep the exemption valid:
(1) Make sure the original emission label is intact.
(2) Add a permanent supplemental label to the engine in a position where it will remain clearly visible after installation in the vehicle. In your engine label, do the following:
(i) Include the heading: "Recreational Vehicle Emission Control Information".
(ii) Include your full corporate name and trademark.
(iii) State: "THIS ENGINE WAS ADAPTED FOR RECREATIONAL USE WITHOUT AFFECTING ITS EMISSION CONTROLS."
(iv) State the date you finished installing (month and year).
(3) Make the original and supplemental labels readily visible after the engine is installed in the vehicle or, if vehicle obscures the engine’s labels, make sure the vehicle manufacturer attaches duplicate labels, as described in §1068.105 of this chapter.
(4) Send the Designated Officer a signed letter by the end of each calendar year (or less often if we tell you) with all the following information:
(i) Identify your full corporate name, address, and telephone number.
(ii) List the models you expect to produce under this exemption in the coming year.
(iii) State: "We produce each listed model for recreational application without making any changes that could increase its certified emission levels, as described in 40 CFR 1051.605."
(e) If your vehicles do not meet the criteria listed in paragraph (c) of this section, they will be subject to the standards and prohibitions of this part. Producing these vehicles without a valid exemption or certificate of conformity would violate the prohibitions in §1068.100 of this chapter.
(f) If we request it, you must send us emission test data on the applicable recreational duty cycle(s) (see §§1051.505 and 1051.510). You may include the data in your application for certification or in your letter requesting the

exemption.
(g) Vehicles exempted under this section are subject to all the requirements affecting engines and vehicles under 40 CFR part 86 or part 1048, as applicable. The requirements and restrictions of 40 CFR part 86 or 1048 apply to anyone manufacturing these engines, anyone manufacturing vehicles that use these engines, and all other persons in the same manner as if these engines were used in a motor vehicle or other nonrecreational application.

§1051.610 What are the provisions for producing recreational vehicles with engines already certified under the motor-vehicle program or the Large SI program?
(a) You may produce a recreational vehicle using a motor vehicle engine, or a Large SI engine if you meet three criteria:
(1) The engine or vehicle is certified to 40 CFR part 86 or 1048.
(2) The engine is not adjusted outside the manufacturer's specifications.
(3) The engine or vehicle is not modified in any way that may affect its emission control. This applies to exhaust and evaporative emission controls, but not refueling emission controls.
(b) This section does not apply if you manufacture the engine yourself; see §1051.605.

§1051.615 What are the special provisions for certifying small recreational engines?
(a) If an off-highway motorcycle or ATV has an engine with total displacement of 70 cc or less, you may choose for these engines to meet the Phase 1 emission standards from 40 CFR part 90 that apply to Class I nonhandheld engines instead of the requirements of this part. In this case, all the requirements and prohibitions of 40 CFR part 90 relevant to Class I engines meeting Phase 1 standards apply to these engines and vehicles, with the following additional provisions:
(1) If you qualify as a small-volume manufacturer under this part, emission standards apply beginning with the 2008 model year. Otherwise, emission standards apply beginning with the 2006 model year.
(2) If you qualify as a small-volume manufacturer under this part, the provisions of §1068.241 of this chapter apply to these engines.
(3) The provisions of §1068.240 of this chapter apply to these engines.
(b) If you do not certify the engines under 40 CFR part 90, then all the requirements and prohibitions of this part apply to these engines and vehicles.
(c) Once emission standards apply, producing these engines or vehicles without a valid exemption or certificate of conformity under this part or part 90 of this chapter would violate the prohibitions in §1068.101 of this chapter.

§1051.620 When may a manufacturer introduce into commerce an uncertified recreational vehicle to be used for competition?
(a) You may introduce into commerce a new recreational vehicle that is to be used for competition if we grant you an exemption under this section.
(b) We will exempt vehicles that we determine will be used solely for competition. The basis of our determinations are described in paragraphs (b)(1) and (b)(2) and (c) of this section.
(1) Off-highway motorcycles. Motorcycles that are marketed and labeled as only for competitive use and which meet at least four of the criteria listed in paragraphs (b)(1)(i) through (v) of this section are considered to be used solely for competition, except in cases where other information is available that indicates that they are not used solely for competition. The following features are indicative of motorcycles used solely for competition:
(i) The absence of a headlight or other lights.
(ii) The absence of a spark arrestor.
(iii) The absence of manufacturer warranty.
(iv) Suspension travel greater than 10 inches.
(v) Engine displacement greater than 50 cc.
(2) Snowmobiles and ATVs. Snowmobiles and ATVs meeting all of the following criteria are considered to be used solely for competition, except in cases where other information is available that indicates that they are not used solely for competition:
(i) The vehicle or vehicle may not be sold in any public dealership.

(ii) Sale of the vehicle must be limited to professional racers or other qualified racers.

(iii) The vehicle must have performance characteristics that are substantially superior to noncompetitive models.

(c) Vehicles not meeting the applicable criteria listed in paragraph (b) of this section will be exempted only in cases where the manufacturer has clear and convincing evidence that the vehicles for which the exemption is being sought will be used solely for competition.

(d) You must permanently label vehicles exempted under this section to clearly indicate that they are to be used only for competition. Failure to properly label a vehicle will void the exemption for that vehicle.

(e) If we request it, you must provide us any information we need to determine whether the vehicles are used solely for competition.

§1051.625 What special provisions apply to unique snowmobile designs?

(a) We may permit you to produce up to 300 snowmobiles per year that are certified to less stringent emission standards than those in §1051.101, as long as you meet all the conditions and requirements in this section.

(b) To be eligible for these alternate standards, you must be a small-volume manufacturer.

(c) To apply for alternate standards under this section, send the Designated Officer a written request. In your request, do two things:

(1) Show that the snowmobile has unique design, calibration, or operating characteristics that make it atypical and infeasible or highly impractical to meet the emission standards in §1051.101, considering technology, cost, and other factors.

(2) Identify the level of compliance you can achieve, including a description of available emission-control technologies and any constraints that may prevent more effective use of these technologies.

(d) You must give us other relevant information if we ask for it.

(e) An authorized representative of your company must sign the request and include the statement: "All the information in this request is true and accurate, to the best of my knowledge."

(f) Send your request for this extension at least nine months before the relevant deadline. If different deadlines apply to companies that are not small-volume manufacturers, do not send your request before the regulations in question apply to the other manufacturers.

(g) If we approve your request, we will set alternate standards for your qualifying snowmobiles. These standards will not be above 400 g/kW-hr for CO or 150 g/kW-hr for HC.

(h) You may produce these snowmobiles to meet the alternate standards we establish under this section as long as you continue to produce them at the same or lower emission levels.

(i) Do not include snowmobiles you produce under this section in any averaging, banking, or trading calculations under Subpart H of this part.

(j) You must meet all the requirements of this part, except as noted in this section.

Subpart H—Averaging, banking, and trading for certification

§1051.701 General Provisions.

(a) You may average, bank, and trade emission credits for certification as described in this subpart to meet the average standards of this part. To do this you must show that your average emission levels are below the applicable standards in subpart B of this part, or that you have sufficient credits to offset a credit deficit for the model year (as calculated in §1051.720

(b) There are separate averaging, banking, and trading programs for snowmobiles, ATVs, and off-highway motorcycles. You may not exchange credits from engine families of one type of these vehicles with those from engine families of another type. You may also not exchange credits with other families of the same type if you use different measurement procedures for the different engine families (for example, ATVs certified to chassis-based vs. engine-based standards).

(c) The definitions of Subpart I of this part apply to this subpart. The following definitions also apply.

(1) Average standard means the standard that applies on average to all your vehicle under this part.

(2) Broker means any entity that facilitates a trade between a buyer and seller.

(3) Buyer means the entity that receives credits as a result of trade or transfer.

(4) Reserved credits means credits generated but not yet verified by EPA in the end of year report review.

(5) Seller means the entity that provides credits during a trade or transfer.

(d) Do not include any exported vehicles in the certification averaging, banking, and trading program. Include only vehicles certified under this part.

§1051.705 How do I average emission levels?

(a) As specified in subpart B of this part, certify each vehicle to a family emission limit (FEL).

(b) Calculate a preliminary average emission level according to §1051.720 using projected production volumes for your application for certification.

(c) After the end of your model year, calculate a final average emission level according to §1051.720 for each type of recreational vehicle or engine you manufacture or import. Use actual production volumes.

(d) If your preliminary average emission level is below the allowable average standard, see §1051.710 for information about generating and banking emission credits. These credits will be considered reserved until verified by EPA during the end of year report review.

§1051.710 How do I generate and bank emission credits?

(a) If your average emission level is below the average standard, you may calculate credits according to §1051.720.

(b) You may generate credits if you are a certifying manufacturer.

(c) You may bank unused emission credits, but only after the end of the calendar year and after we have reviewed your end-of-year reports. Credits you generate do not expire.

(d) During the calendar year and before you send in your end-of-year report, you may consider reserved any credits you originally designate for banking during certification. You may redesignate these credits for trading or transfer in your end-of-year report, but they are not valid to demonstrate compliance until verified.

(e) You may use for averaging or trading any credits you declared for banking from the previous calendar year that we have not reviewed. But, we may revoke these credits later—following our review of your end-of-year report or audit actions. For example, this could occur if we find that credits are based on erroneous calculations; or that emission levels are misrepresented, unsubstantiated, or derived incorrectly in the certification process.

§1051.715 How do I trade emission credits?

(a) You may trade only banked credits, not reserved credits.

(b) You may trade banked credits to any certifying manufacturer.

(c) If a negative credit balance results from a credit trade, both buyers and sellers are liable, except in cases involving fraud. We may void the certificates of all emission families participating in a negative trade.

(1) If you buy credits but have not caused the negative credit balance, you must only supply more credits equivalent to the amount of invalid credits you used.

(2) If you caused the credit shortfall, you may be subject to the requirements of §1045.730(b)(7).

§1051.720 How do I calculate my average emission level or emission credits?

(a) Calculate your average emission level for each type of recreational vehicle or engine for each model year according to the following equation and round it to the nearest tenth of a g/km or g/kW-hr. Use consistent units throughout the calculation. Calculate the average emission level as:

(1)

$$\text{Emission level} = \left[\sum_i (FEL)_i \times (UL)_i \times (Production)_i\right] / \left[\sum_i (Production)_i \times (UL)_i\right]$$

(2) Where:

(i) FEL_i = the FEL to which the engine family is certified.

(ii) UL_i = the useful life of the engine family.

(iii) $Production_i$ = the number of vehicles in the engine family

(3) Use production projections for initial certification, and actual production volumes to determine compliance at the end of the model year.

(b) If your average emission level is below the average standard, calculate credits available for banking according to the following equation and round them to the nearest tenth of a gram:

$$\text{Credit} = \left[\text{(Average standard - Emission level)}\right] \times \left[\sum_i (Production)_i \times (UL)_i\right]$$

(c) If your average emission level is above the average standard, calculate your preliminary credit deficit according to the following equation, rounding to the nearest tenth of a gram:

$$\text{Deficit} = \left[\text{(Emission level - Average standard)}\right] \times \left[\sum_i (Production)_i \times (UL)_i\right]$$

§1051.725 What information must I retain?

(a) Maintain and keep five types of properly organized and indexed records for each group and for each emission family:

(1) Model year and EPA emission family.

(2) FEL.

(3) Useful life.

(4) Projected production volume for the model year.

(5) Actual production volume for the model year.

(b) Keep paper records of this information for three years from the due date for the end-of-year report. You may use any additional storage formats or media if you like.

(c) Follow §1051.730 to send us the information you must keep.

(d) We may ask you to keep or send other information necessary to implement this subpart.

§1051.730 What information must I report?

(a) Include the following information in your applications for certification:

(1) A statement that, to the best of your belief, you will not have a negative credit balance for any type of recreational vehicle or engine when all credits are calculated. This means that if you believe that your average emission level will be above the standard (i.e., that you will have a deficit for the model year), you must have banked credits (or project to have traded credits) to offset the deficit.

(2) Detailed calculations of projected emission credits (zero, positive, or negative) based on production projections.

(i) If you project a credit deficit, state the source of credits needed to offset the credit deficit.

(ii) If you project credits, state whether you will reserve them for banking or transfer them.

(b) At the end of each model year, send an end-of-year report.

(1) Make sure your report includes three things:

(i) Calculate in detail your average emission level and any emission credits (zero, positive, or negative) based on actual production volumes.

(ii) If your average emission level is above the allowable average standard, state the source of credits

needed to offset the credit deficit.

(iii) If your average emission level is below the allowable average standard, state whether you will reserve the credits for banking or transfer them.

(2) Base your production volumes on the point of first retail sale. This point is called the final product-purchase location.

(3) Send end-of-year reports to the Designated Officer within 120 days of the end of the model year. If you send reports later, you are violating the Clean Air Act.

(4) If you generate credits for banking and you do not send your end-of-year reports within 120 days after the end of the model year, you may not use or trade the credits until we receive and review your reports. You may not use projected credits pending our review.

(5) You may correct errors discovered in your end-of-year report, including errors in calculating credits according to the following table:

If...	And if...	Then we...
Our review discovers an error in your end-of-year report that increases your credit balance	the discovery occurs within 180 days of receipt	restore the credits for your use.
You discover an error in your report that increases your credit balance	"	"
We or you discover an error in your report that increases your credit balance	the discovery occurs more than 180 days after receipt	do not restore the credits for your use.
We discover an error in your report that reduces your credit balance	at any time after receipt	reduce your credit balance

(6) If our review of a your end-of year-report shows a negative balance, you may buy credits to bring your credit balance to zero. But you must buy 1.1 credits for each 1.0 credit needed. If enough credits are not available to bring your credit balance to zero, we may void the certificates for all families certified to standards above the allowable average.

(c) Within 90 days of any credit trade or transfer, you must send the Designated Officer a report of the trade or transfer that includes three types of information:

(1) The corporate names of the buyer, seller, and any brokers.

(2) Information about the credits that depends on whether you trade or transfer them.

(i) For trades, describe the banked credits being traded.

(ii) For transfers, calculate the credits in detail and identify the source or use of the credits.

(3) Copies of contracts related to credit trading or transfer from the buyer, seller, and broker, as applicable.

(d) Include in each report a statement certifying the accuracy and authenticity of its contents.

(e) We may void a certificate of conformity for any emission family if you do not keep the records this section requires or give us the information when we ask for it.

Subpart I—Definitions and other reference information

§1051.801 What definitions apply to this part?

The following definitions apply to this part. The definitions apply to all subparts unless we note otherwise. All undefined terms have the meaning the Act gives to them.

Act means the Clean Air Act, as amended, 42 U.S.C. 7401 et.seq.

Adjustable parameter means any device, system, or element of design that someone can adjust (including those which are difficult to access) and that, if adjusted, may affect emissions or engine performance during emission testing or normal in-use operation.

Aftertreatment means relating to any system, component, or technology mounted downstream of the exhaust valve or exhaust port whose design function is to reduce exhaust emissions.

All-terrain vehicle means a nonroad vehicle with three or more wheels and a seat, designed for operation over rough terrain and intended primarily for transportation. This includes both land-based and amphibious vehicles.

Auxiliary emission-control device means any element of design that senses temperature, engine rpm, motive speed, transmission gear, atmospheric pressure, manifold pressure or vacuum, or any other parameter to activate, modulate, delay, or deactivate the operation of any part of the emission-control system. This also includes any other feature that causes in-use emissions to be higher than those measured under test conditions, except as we allow under this part.

Broker means any entity that facilitates a trade of emission credits between a buyer and seller.

Calibration means the set of specifications and tolerances specific to a particular design, version, or application of a component or assembly capable of functionally describing its operation over its working range.

Certification means obtaining a certificate of conformity for an engine family that complies with the emission standards and requirements in this part.

Compression-ignition means relating to a type of reciprocating, internal-combustion engine that is not a spark-ignition engine.

Crankcase emissions means airborne substances emitted to the atmosphere from any part of the engine crankcase's ventilation or lubrication systems. The crankcase is the housing for the crankshaft and other related internal parts.

Designated Officer means the Manager, Engine Compliance Programs Group (6403-J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., Washington, DC 20460.

Emission-control system means any device, system, or element of design that controls or reduces the regulated emissions from a vehicle.

Emission-data vehicle means a vehicle or engine that is tested for certification.

Emission-related maintenance means maintenance that substantially affects emissions or is likely to substantially affect emissions deterioration.

Engine family means a group of vehicles with similar emission characteristics, as specified in §1051.230.

Manufacturer has the meaning given in section 216(1) of the Act. In general, this term includes any person who manufactures a vehicle or engine for sale in the United States or otherwise introduces a new vehicle or engine into commerce in the United States. This includes importers.

Good engineering judgment has the meaning we give it in §1068.005 of this chapter.

Fuel system means all components involved in transporting, metering, and mixing the fuel from the fuel tank to the combustion chamber(s), including the fuel tank, fuel tank cap, fuel pump, fuel filters, fuel lines, carburetor or fuel-injection components, and all fuel-system vents.

Hydrocarbon (HC) means the hydrocarbon group on which the emission standards are based for each fuel type. For gasoline- and LPG-fueled engines, HC means total hydrocarbon (THC). For natural gas-fueled engines, HC means nonmethane hydrocarbon (NMHC). For alcohol-fueled engines, HC means total hydrocarbon equivalent (THCE).

Identification number means a unique specification (for example, model number/serial number combination) that allows someone to distinguish a particular vehicle or engine from other similar vehicle or engines.

Maximum test torque means the torque output observed with the maximum fueling rate possible at a given

speed.

Model year means one of the following things:

(1) For freshly manufactured vehicles or engines (see definition of "new" paragraph (1)), model year means one of the following:

(i) Calendar year.

(ii) Your annual new model production period if it is different than the calendar year. This must include January 1 of the calendar year for which the model year is named. It may not begin before January 2 of the previous calendar year and it must end by December 31 of the named calendar year.

(2) For a vehicle or engine that is converted to a nonroad vehicle or engine after being placed into service in a motor vehicle, model year means the calendar year in which the vehicle or engine was originally produced (see definition of "new" paragraph (2)).

(3) For a nonroad vehicle excluded under §1051.005 that is later converted to operate in an application that is not excluded, model year means the calendar year in which the vehicle was originally produced (see definition of "new" paragraph (3)).

(4) For engines that are not freshly manufactured but are installed in new nonroad vehicle, model year means the calendar year in which the engine is installed in the new nonroad vehicle (see definition of "new" paragraph (4)).

(5) For a vehicle or engine modified by an importer (not the original manufacturer) who has a certificate of conformity for the imported vehicle or engine (see definition of "new" paragraph (5)), model year means one of the following:

(i) The calendar year in which the importer finishes modifying and labeling the vehicle or engine.

(ii) Your annual production period for producing vehicles or engines if it is different than the calendar year; follow the guidelines in paragraph (1)(ii) of this definition.

(6) For a vehicle or engine you import that does not meet the criteria in paragraphs (1) through (5) of the definition of "new" model year means the calendar year in which the manufacturer completed the original assembly of the vehicle or engine. In general, this applies to used equipment that you import without conversion or major modification.

Off-highway motorcycle means a two-wheeled vehicle with a nonroad engine and a seat (excluding marine vessels and aircraft). Note: highway motorcycles are regulated under 40 CFR part 86.

Motor vehicle has the meaning we give in §85.1703(a) of this chapter. In general, motor vehicle means a self-propelled vehicle that can transport one or more people or any material, but does not include any of the following:

(1) Vehicles having a maximum ground speed over level, paved surfaces no higher than 40 km per hour (25 miles per hour).

(2) Vehicles that lack features usually needed for safe, practical use on streets or highways— for example, safety features required by law, a reverse gear (except for motorcycles), or a differential.

(3) Vehicles whose operation on streets or highways would be unsafe, impractical, or highly unlikely. Examples are vehicles with tracks instead of wheels, very large size, or features associated with military vehicles, such as armor or weaponry.

New means relating to any of the following vehicles or engines:

(1) A freshly manufactured engine or vehicle for which the ultimate buyer has never received the equitable or legal title. The vehicle or engine is no longer new when the ultimate buyer receives this title or the product is placed into service, whichever comes first.

(2) An engine originally manufactured as a motor vehicle engine that is later intended to be used in a piece of nonroad equipment. The engine is no longer new when it is placed into nonroad service.

(3) A nonroad engine that has been previously placed into service in an application we exclude under §1051.005, where that engine is installed in a piece of equipment for which these exclusions do not apply. The engine is no longer new when it is placed into nonroad service.

(4) An engine not covered by paragraphs (1) through (3) of this definition that is intended to be installed in new nonroad equipment. The engine is no longer new when the ultimate buyer receives a title for the equipment or the product is placed into service, whichever comes first.

(5) An imported nonroad vehicle or engine covered by a certificate of conformity issued under this part, where someone other than the original manufacturer modifies the vehicle or engine after its initial assembly and holds the

certificate. The vehicle or engine is no longer new when it is placed into nonroad service.
(6) An imported nonroad vehicle or engine that is not covered by a certificate of conformity issued under this part at the time of importation.

New nonroad equipment means either of the following things:
(1) A nonroad vehicle or other piece of equipment for which the ultimate buyer has never received the equitable or legal title. The product is no longer new when the ultimate buyer receives this title or the product is placed into service, whichever comes first.
(2) An imported nonroad piece of equipment with a vehicle or engine not covered by a certificate of conformity issued under this part at the time of importation and manufactured after the date for applying the requirements of this part.

Noncompliant vehicle or engine means a vehicle or engine that was originally covered by a certificate of conformity, but is not in the certified configuration or otherwise does not comply with the conditions of the certificate.

Nonconforming vehicle or engine means a vehicle or engine not covered by a certificate of conformity that would otherwise be subject to emission standards.

Nonmethane hydrocarbon means the difference between the emitted mass of total hydrocarbons and the emitted mass of methane.

Nonroad means relating to nonroad vehicle or engines.

Nonroad engine has the meaning given in §1068.025 of this chapter. In general this means all internal-combustion engines except motor vehicle engines, stationary engines, or engines used solely for competition. This part only applies to nonroad engines that are used in snowmobiles, off-highway motorcycles, and ATVs (see §1051.005).

Oxides of nitrogen means nitric oxide (NO) and nitrogen dioxide (NO_2). Oxides of nitrogen are expressed quantitatively as if the NO were in the form of NO_2 (assume a molecular weight for oxides of nitrogen equivalent to that of NO_2).

Phase 1 means relating to Phase 1 standards of §1051.101 or §1051.103.

Phase 2 means relating to Phase 2 standards of §1051.101 or §1051.103.

Physically adjustable range means the entire range over which an engine parameter can be adjusted, except as modified by §1051.115(c).

Placed into service means used for its intended purpose.

Recreational means, for purposes of this part, relating to snowmobiles, all-terrain vehicles, and off-highway motorcycles we regulate under this part. Note that 40 CFR part 90 applies to other recreational vehicles.

Revoke means to discontinue the certificate for an engine family. If we revoke a certificate, you must apply for a new certificate before continuing to produce the affected vehicles or engines. This does not apply to vehicles or engines you no longer possess.

Round means to round numbers according to ASTM E29-93a, which is incorporated by reference (see §1051.810), unless otherwise specified.

Scheduled maintenance means adjusting, repairing, removing, disassembling, cleaning, or replacing components or systems that is periodically needed to keep a part from failing or malfunctioning. It also may mean actions you expect are necessary to correct an overt indication of failure or malfunction for which periodic maintenance is not appropriate.

Small-volume manufacturer means:
(1) For motorcycles and ATVs, a manufacturer with U.S.-directed production of fewer than 5,000 off-road motorcycles and ATVs (combined number) in 2001. For manufacturers owned by a parent company, the limit applies to the production of the parent company and all of its subsidiaries.
(2) For snowmobiles, a manufacturer with annual U.S. directed production of fewer than 300 snowmobiles in 2001. For manufacturers owned by a parent company, the limit applies to the production of the parent company and all of its subsidiaries.

Snowmobile means a vehicle designed to operate outdoors only over snow-covered ground, with a maximum width of 1.5 meters or less.

Spark-ignition means relating to a 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.

Stoichiometry means the proportion of a mixture of air and fuel such that the fuel is fully oxidized with no remaining oxygen. For example, stoichiometric combustion in gasoline engines typically occurs at an air-fuel mass ratio of about 14.7.

Suspend means to temporarily discontinue the certificate for an engine family. If we suspend a certificate, you may not sell vehicles or engines from that engine family unless we reinstate the certificate or approve a new one.

Test vehicle or engine means a vehicle or engine in a test sample.

Test sample means the collection of vehicles or engines selected from the population of an engine family for emission testing.

Total hydrocarbon means the combined mass organic compounds measured by our total hydrocarbon test procedure, expressed as a hydrocarbon with a hydrogen-to-carbon mass ratio of 1.85:1.

Total hydrocarbon equivalent means the sum of the carbon mass contributions of non-oxygenated hydrocarbons, alcohols and aldehydes, or other organic compounds that are measured separately as contained in a gas sample, expressed as petroleum-fueled engine hydrocarbons. The hydrogen-to-carbon ratio of the equivalent hydrocarbon is 1.85:1.

Ultimate buyer means ultimate purchaser.

Ultimate purchaser means, with respect to any new vehicle or engine, the first person who in good faith purchases such vehicle or engine for purposes other than resale.

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands.

Useful life means the period during which the vehicle is designed to properly function in terms of reliability and fuel consumption, without being remanufactured, specified as a number of hours of operation or calendar years. It is the period during which a new vehicle is required to comply with all applicable emission standards.

U.S.-directed production means the number of vehicle units, subject to the requirements of this part, produced by a manufacturer (and/or imported) for which the manufacturer has a reasonable assurance that sale was or will be made to ultimate buyers in the Unites States.

Void means to invalidate a certificate or an exemption. If we void a certificate, all the vehicles produced under that engine family for that model year are considered noncompliant, and you are liable for each vehicle produced under the certificate and may face civil or criminal penalties or both. If we void an exemption, all the vehicles produced under that exemption are considered uncertified (or nonconforming), and you are liable for each vehicle produced under the exemption and may face civil or criminal penalties or both. You may not produce any additional vehicles using the voided exemption.

§1051.805 What symbols, acronyms, and abbreviations does this part use?

The following symbols, acronyms, and abbreviations apply to this part.

° C	degrees Celsius
ASTM	American Society for Testing and Materials
ATV	all-terrain vehicle
cc	cubic centimeters
CO	carbon monoxide
CO_2	carbon dioxide
EPA	Environmental Protection Agency
g/kW-hr	grams per kilowatt-hour
LPG	liquefied petroleum gas
m	meters
mm Hg	millimeters of mercury
NMHC	nonmethane hydrocarbons
NOx	oxides of nitrogen (NO and NO_2)
rpm	revolutions per minute
SAE	Society of Automotive Engineers
SI	spark-ignition

THC	total hydrocarbon
THCE	total hydrocarbon equivalent
U.S.C.	United States Code

§1051.810 What materials does this part reference?

We have incorporated by reference the documents listed in this section. The Director of the Federal Register approved the incorporation by reference as prescribed in 5 U.S.C. 552(a) and 1 CFR part 51. Anyone may inspect copies at:

U.S. EPA
OAR, Air and Radiation Docket and Information Center
401 M Street, SW
Washington, DC 20460

or at

Office of the Federal Register
800 N. Capitol St. NW, 7th Floor, Suite 700
Washington, DC 20001

(1) ASTM material. Table 1 of §1051.810 lists material from the American Society for Testing and Materials that we have incorporated by reference. The first column lists the number and name of the material. The second column lists the sections of this part where we reference it. The second column is for information only and may not include all locations. Anyone may receive copies of these materials from:

American Society for Testing and Materials
1916 Race St.
Philadelphia, PA 19103

Table 1 of §1051.810—ASTM Materials

Document number and name	part 1051 reference
ASTM E29-93a:	1051.240
Standard Practice for Using Significant	1051.315
Digits in Test Data to Determine	1051.345
Conformance with Specifications	1051.410
	1051.415

(2) ISO material. Table 2 of §1051.810 lists material from the International Organization for Standardization that we have incorporated by reference. The first column lists the number and name of the material. The second column lists the section of this part where we reference it. The second column is for information only and may not be all-inclusive. Anyone may receive copies of these materials from:

International Organization for Standardization
Case Postale 56,
CH-1211 Geneva 20
Switzerland

Table 2 of §1051.810—ISO Materials

Document number and name	part 1051 reference
ISO 9141-2 "Road vehicles—Diagnostic systems—Part 2: CARB requirements for interchange of digital information," (February 1994).	1051.110
ISO 14230-4 "Road vehicles—Diagnostic systems—KWP 2000 requirements for Emission-related systems," (June 2000).	1051.110

§1051.815 How should I request EPA to keep my information confidential?

(a) Clearly show what you consider confidential by marking, circling, bracketing, stamping, or some other method. We will store your confidential information as described in 40 CFR part 2. Also, we will disclose it only as specified in 40 CFR part 2.

(b) If you send us a second copy without the confidential information, we will assume it contains nothing confidential whenever we need to release information from it.

(c) If you send us information without claiming it is confidential, we may make it available to the public without further notice to you, as described in §2.204 of this chapter.

§1051.820 How do I request a public hearing?

(a) File a request for a hearing with the Designated Officer within 15 days of a decision to deny, suspend, revoke, or void your certificate. If you ask later, we may give you a hearing for good cause, but we do not have to.

(b) Include the following in your request for a public hearing:

(1) State which engine family is involved.

(2) State the issues you intend to raise. We may limit these issues, as described elsewhere in this part.

(3) Summarize the evidence supporting your position and state why you believe this evidence justifies granting or reinstating the certificate.

(c) We will hold the hearing as described in 40 CFR part 1068, subpart F.

PART 1065—TEST PROCEDURES AND EQUIPMENT

Subpart A—Applicability and General Provisions

Sec.

Subpart B—Equipment and Analyzers

Subpart C—Test Fuels and Analytical Gases.

Subpart J—Field Testing.

Subpart K—Definitions and Other Reference Information

Authority: 42 U.S.C. 7401 - 7671(q)

Subpart A—Applicability and General Provisions

§1065.001 Applicability.

(a) This part describes the procedures that apply to testing that we require for the following engines or equipment using the following engines:

(1) large nonroad spark-ignition engines we regulate under 40 CFR part 1048.

(2) snowmobiles, all-terrain vehicles, and off-highway motorcycles we regulate under 40 CFR part 1051.

(b) This part does not apply to any of the following engine or vehicle categories:

(1) light-duty highway vehicles (see 40 CFR part 86).

(2) heavy-duty highway Otto-cycle engines (see 40 CFR part 86).

(3) heavy-duty highway diesel engines (see 40 CFR part 86).

(4) aircraft engines (see 40 CFR part 87).

(5) locomotive engines (see 40 CFR part 92).

(6) land-based nonroad diesel engines (see 40 CFR part 89).

(7) general marine engines (see 40 CFR parts 89 and 94)

(8) marine outboard and personal watercraft engines (see 40 CFR part 91).

(9) small nonroad spark-ignition engines (see 40 CFR part 90).

(c) This part is addressed to you as an engine manufacturer, but it applies equally to anyone who does testing for you, and to us when we conduct testing to determine if you comply with the applicable emission standards.

(d) Follow the provisions of the standard-setting part if they are different than any of the provisions in this part.

(e) For equipment subject to this part and regulated under equipment-based standards, interpret the term "engine" in this part to include equipment (see §1068.025).

§1065.005 Overview of test procedures.

(a) Some of the provisions of this part do not apply to all types of engines. For example, measurement of particulate matter is not generally required for spark-ignition engines. See the standard-setting part to determine which provisions in this part may not apply. Before using the procedures in this part, you should see the standard-setting part to answer at least the following questions:

(1) How should I warm up the test engine before measuring emissions? Do I need to measure cold-start emissions during this warm-up segment of the duty cycle?

(2) Do I need to measure emissions while the hot-stabilized engine operates over a transient schedule?

(3) Which speed and load points should I include for the steady-state segment of the duty cycle?

(4) Which exhaust constituents do I need to measure?

(5) Are there applicable emission standards that affect the limits on engine operation and ambient conditions?

(6) Do emission standards apply to field testing under normal operation?

(7) Does testing require full-flow dilute sampling? Is raw sampling acceptable? Is partial-flow dilute sampling acceptable?

(8) Do any unique specifications apply for test fuels?

(9) What maintenance steps may I plan to do before or between tests on an emission-data engine?

(10) Are there any unique requirements related to stabilizing emission levels on a new engine?

(11) Are there any unique requirements related to testing conditions, such as ambient temperatures or pressures?

(b) The following table shows how this part divides testing specifications into subparts.

Subpart...	This subpart describes...
Subpart A	General provisions for test procedures.
Subpart B	Equipment for performing tests.
Subpart C	Fuels and analytical gases for performing the tests.

Subpart...	This subpart describes...
Subpart D	How to calibrate test equipment.
Subpart E	How to prepare engines for testing, including service accumulation.
Subpart F	How to do an emission test.
Subpart G	How to calculate emission levels from measured data.
Subpart H	How to measure particulate emissions.
Subpart I	How to measure emissions from engines fueled with an oxygenated fuel such as methanol or ethanol.
Subpart J	How to do field testing of in-use vehicles and equipment.
Subpart K	Definitions, abbreviations, and other reference information that applies to emission testing; terms defined in Subpart K are generally identified by italics throughout this part.

§1065.010 Other test procedures.

(a) Your testing. These test procedures apply for all testing that you do to show compliance with emission standards, with a few exceptions listed in this section.

(b) Our testing. These test procedures generally apply for testing that we do to determine if your engines comply with applicable emission standards. We may conduct other testing as allowed by the Act.

(c) Exceptions. You may be allowed or required to use test procedures other than those specified in this part in the following cases:

(1) The test procedures in this part are intended to produce emission measurements equivalent to those that would result from measuring emissions during in-use operation using the same engine configuration installed in a piece of equipment. If good engineering judgment indicates that use of the procedures in this part for an engine would result in measurements that are not representative of in-use operation of that engine, you must notify us. If we determine that using these procedures would result in measurements that are significantly unrepresentative and that changes to the procedures will result in more representative measurements that do not decrease the stringency of emission standards, we will specify changes to the procedures. In your notification to us, you should recommend specific changes you think are necessary.

(2) You may ask to use emission data collected using other test procedures, such as those of the California Air Resources Board or the International Organization for Standardization. We will allow this only if you show us that these data are equivalent to data collected using our test procedures.

(3) You may ask to use alternate procedures that produce measurements equivalent to those obtained using the specified procedures. In this case, send us a written request showing that your alternate procedures are equivalent to the test procedures of this part. If you prove to us that the procedures are equivalent, we will allow you to use them. You may not use alternate procedures until we approve them. Note: We may issue broad approval to all manufacturers for a specific change in the test procedures that allows you to use the alternate procedure without additional approval.

(4) You may ask to use special test procedures if your engine cannot be tested using the specified test procedures (for example, it is incapable of operating on the specified transient cycle). In this case, send us a

written request showing that you cannot satisfactorily test your engines using the test procedures of this part. We will allow you to use special test procedures if we determine that they would produce emission measurements that are representative of those that would result from measuring emissions during in-use operation. You may not use special procedures until we approve them.

(5) Other parts in this chapter (i.e., the parts that define emission standards for your engines) may contain other specifications for test procedures that apply for your engines. In cases where it is not possible to comply with both the test procedures in those parts and the test procedures in this part, you must comply with the test procedures specified in the standard-setting part. Those other parts may also allow you to deviate from the test procedures of this part for other reasons.

§1065.015 Engine testing.

(a) This part describes the procedures for performing exhaust emission tests on engines that must meet emission standards.

(b) Testing generally consists of engine operation on a laboratory dynamometer over a prescribed sequence. (Subpart J of this part contains provisions for in-use testing of engines installed in vehicles or equipment.) You need to sample and analyze the exhaust gases generated during engine operation to determine the concentration of the regulated pollutants.

(c) Concentrations are converted into units of grams of pollutant per kilowatt-hour (g/kW-hr) for comparison with the emission standards that apply.

§1065.020 Limits for test conditions.

(a) Unless specified elsewhere in this chapter, you may conduct tests to determine compliance with duty-cycle emission standards at ambient temperatures from 20° C (68° F) to 30° C (86° F), ambient pressures from 600 mm Hg to 775 mm Hg, and at any ambient humidity level.

(b) Testing conducted to determine compliance with not-to-exceed standards may be conducted at ambient conditions specified in the standard-setting part.

(c) For laboratory engine testing, you may heat and/or dehumidify the dilution air before it enters the CVS.

(d) For laboratory engine testing, if the barometric pressure observed during the generation of the maximum torque curve changes by more than 25 mm Hg from the value measured at the beginning of the map, you must remap the engine. To have a valid test, the average barometric pressure observed during the exhaust emission test must be within 25 mm Hg of the average observed during the maximum torque curve generation.

Subpart B—Equipment and Analyzers

§1065.101 Overview.

[RESERVED]

§1065.105 Dynamometer and engine equipment specifications.

(a) The engine dynamometer system must be capable of controlling engine torque and rpm simultaneously over the applicable test cycle(s). The system should be capable of following the torque and rpm schedules within the accuracy requirements specified in §1065.530; dynamometers that are not capable of meeting the accuracy requirements specified in §1065.530 may be used only with advance approval. For transient testing, engine torque and rpm command set points must be issued at 5 Hz or greater (10 Hz recommended) during the tests. Feedback engine torque and rpm must be recorded at least once every second during the test. In addition to these general requirements, for all testing, the engine or dynamometer readout signals for speed and torque must meet the following accuracy specifications:

(1) Engine speed readout must be accurate to within ±2 percent of the absolute standard value. A 60-tooth (or greater) wheel in combination with a common mode rejection frequency counter is considered an absolute standard for engine or dynamometer speed.

(2) Engine flywheel torque readout must be accurate to either within ±3 percent of the NIST true value torque (as defined in §1065.305), or the following accuracies:

If the full-scale torque value is...	Engine flywheel torque readout must be within...
$T \leq 550$ ft-lbs	±2.5 ft-lbs of NIST true value
$550 < T \leq 1050$ ft-lbs	±5.0 ft-lbs of NIST true value
$T > 1050$ ft-lbs	±10.0 ft-lbs of NIST true value

(3) Option: You may use internal dynamometer signals (i.e., armature current, etc.) for torque measurement, as long as you can show that the engine flywheel torque during the test cycle conforms to the accuracy specifications in paragraph (b)(2) of this section. Your measurement system must include compensation for increased or decreased flywheel torque due to the armature inertia during accelerations and decelerations in the test cycle.

(b) To verify that the test engine has followed the test cycle correctly, you must collect the dynamometer or engine readout signals for speed and torque in a manner that allows a statistical correlation between the actual engine performance and the test cycle (see §1065.530). Normally this collection process would involve conversion of analog dynamometer or engine signals into digital values for storage in a computer. You must perform the conversion of dynamometer or engine values (computer or other) that are used to evaluate the validity of engine performance in relation to the test cycle while meeting the following criteria:

(1) Speed values used for cycle evaluation are accurate to within 2 percent of the dynamometer or engine speed readout value.

(2) Engine flywheel torque values used for cycle evaluation are accurate to within 2 percent of the dynamometer or engine flywheel torque readout value.

(c) Option: For some systems it may be more convenient to combine the tolerances in paragraphs (a) and (b) of this section. You may do this if you use the root mean square method (RMS). The RMS values would then refer to accuracy in relationship to absolute standard or to NIST true values.

(1) Speed values used for cycle evaluation must be accurate to within ±2.8 percent of the absolute standard values, as defined in paragraph (d) of this section.

(2) Engine flywheel torque values used for cycle evaluation must be accurate to within ±3.6 percent of NIST

true values, as determined in §1065.305.

§1065.110 Exhaust gas sampling system; SI engines.

(a) General. The exhaust gas sampling system described in this section is designed to measure the true mass of gaseous emissions in the exhaust of SI engines. Additional requirements apply for engines that use oxygenated fuels. In the CVS concept of measuring mass emissions, you must measure the total volume of the mixture of exhaust and dilution air and collect a continuously proportioned volume of sample for analysis. Determine the mass emissions from the sample concentration and total flow over the test period.

(b) Critical flow venturi. The operation of the Critical Flow Venturi Constant-Volume Sampler (CFV-CVS) (see Figure B110-1) is based upon the principles of fluid dynamics associated with critical flow. The CFV system is commonly called a constant-volume system (CVS) even though the flow varies. It would be more proper to call the critical flow venturi (CFV) system a constant-proportion sampling system, since proportional sampling throughout temperature excursions is maintained by use of a small CFV in the sample lines. The variable mixture flow rate is maintained at choked flow, which is inversely proportional to the square root of the gas temperature, and is computed continuously. Since the pressure and temperature are the same at all venturi inlets, the sample volume is proportional to the total volume.

(c) Configuration variations. Since various configurations can produce equivalent results, you need not conform exactly to the drawings in this subpart. You may use additional components such as instruments, valves, solenoids, pumps and switches to provide additional information and coordinate the functions of the component systems. You may exclude other components such as snubbers, which are not needed to maintain accuracy on some systems, if you exclude them based upon good engineering judgment.

(d) CFV component description. The CFV sample system shown in Figure B110-1 consists of a dilution air filter (optional) and mixing assembly, cyclone particulate separator (optional), unheated sampling venturies for the bag sample, critical flow venturi, and associated valves, pressure and temperature sensors. With the exception of the hydrocarbon sampling system for two-stroke engines, the temperature of the sample lines must be more than 3° C above the maximum dew point of the mixture and less than 121° C; it is recommended that you maintain them at 113 ± 8° C. For the hydrocarbon sampling system with two-stroke engines, the temperature of the sample lines must be more than 3° C above the maximum dew point of the mixture (water and/or HC) and less than 200 °C; it is recommended that you maintain them at 190 ± 8° C). The CFV sample system must conform to the following requirements:

(1) Do not artificially lower exhaust system backpressure by the CVS or dilution air inlet system. Make the measurements to verify this in the raw exhaust immediately upstream of the inlet to the CVS. This verification requires the continuous measurement and comparison of raw exhaust static pressure observed during a transient cycle, both with and without the operating CVS. Static pressure measured with the operating CVS system must remain within ±5 inches of water (1.2 kPa) of the static pressure measured without connection to the CVS, at identical moments in the test cycle. (We will use sampling systems capable of maintaining the static pressure to within ±1 inch of water (0.25 kPa) if a written request shows that this closer tolerance is necessary.) This requirement serves as a design specification for the CVS/dilution air inlet system, and should be performed as often as good engineering practice dictates (for example, after installation of an uncharacterized CVS, addition of an unknown inlet restriction on the dilution air, etc.).

(2) The temperature measuring system (sensors and readout) must have an accuracy and precision of ±3.4° F (±1.9° C). The temperature measuring system used in a CVS without a heat exchanger must have a response time of 1.50 seconds to 62.5 percent of a temperature change (as measured in hot silicone oil). There is no response time requirement for a CVS equipped with a heat exchanger.

(3) The pressure measuring system (sensors and readout) must have an accuracy and precision of ±3 mm Hg (0.4 kPa).

(4) The flow capacity of the CVS must be large enough to eliminate water condensation in the system. You may dehumidify the dilution air before it enters the CVS. Heating is also allowed under the following conditions:

(i) The air (or air plus exhaust gas) temperature does not exceed 250° F (121° C).

(ii) Calculation of the CVS flow rate necessary to prevent water condensation is based on the lowest temperature encountered in the CVS prior to sampling. (It is recommended that the CVS system be insulated when heated dilution air is used.)

(iii) The dilution ratio is sufficiently high to prevent condensation in bag samples as they cool to room temperature.

(5) Sample collection bags for dilution air and exhaust samples must be big enough to allow unimpeded sample flow.

(e) EFC-CFV component description. The EFC-CFV sample system is identical to the CFV system described in paragraph (b) of this section, with the addition of electronic flow controllers, metering valves, and separate flow meters to totalize sample flow volumes (optional). The EFC sample system must conform to the following requirements:

(1) All of the requirements of paragraph (b) of this section.

(2) The ratio of sample flow to CVS flow must not vary by more ±5 percent from the setpoint of the test.

(3) The sample flow totalizers must meet the accuracy specifications of §1065.145. You may obtain total sample flow volumes from the flow controllers, with advance approval from us, as long as you can show that they meet the accuracy specifications of §1065.145.

(f) Component description, PDP-CFV. The PDP-CFV sample system is identical to the CFV system described in paragraph (b) of this section with the following changes and additional requirements:

(1) A heat exchanger is required.

(2) You must use positive displacement pumps for the CVS flow and for the sampling system flows.

(3) The gas mixture temperature, measured at a point immediately ahead of the positive displacement pump and after the heat exchanger, must be maintained within ±10° F (±5.6° C) of the average operating temperature observed during the test. (The average operating temperature may be estimated from the average operating temperature from similar tests.) The temperature measuring system (sensors and readout) must have an accuracy and precision of ±3.4° F (1.9° C). There is no response time requirement for a CVS equipped with a heat exchanger.

§1065.115 Exhaust gas sampling system; CI engines.

[RESERVED]

§1065.120 Analyzers (overview/general response characteristics).

(a) General. The specifications for analyzers and analytical equipment are described in the following sections and subparts:

(1) The analyzers for measuring hydrocarbon, NOx, CO, and CO_2 emission concentrations are specified in §1065.125 through §1065.135 of this chapter.

(2) The analytical equipment for measuring particulate emissions is specified in Subpart H of this part.

(3) The analytical equipment for measuring emissions of oxygenated compounds (for example, methanol) is specified in Subpart I of this part.

(4) The analytical equipment for measuring in-use emissions is specified in Subpart J of this part.

(b) Response time. Analyzers must have the following response characteristics:

(1) For steady-state testing and transient testing with bag sample analysis, the analyzer must reach at least 90 percent of its final response within 5.0 seconds after any step change to the input concentration greater than or equal to 80 percent of full scale.

(2) For transient testing with continuous measurement, the analyzer must reach at least 90 percent of its final response within 1.0 second after any step change to the input concentration greater than or equal to 80 percent of full scale.

(c) Precision and noise.

(1) The precision of the analyzers must be no worse than ±1 percent of full-scale concentration for each range used above 155 ppm (or ppmC), or ±2 percent for each range used below 155 ppm (or ppmC). For the purpose of this paragraph, precision is defined as 2.5 times the standard deviation(s) of 10 repetitive responses to a given calibration or span gas.

(2) The analyzer peak-to-peak response to zero and calibration or span gases over any 10-second period shall not exceed 2 percent of full/scale chart deflection on all ranges used.

(d) Drift. (1) The zero-response drift during a 1-hour period shall be less than 2 percent of full-scale chart deflection on the lowest range used. The zero-response is defined as the mean response including noise to a

zero-gas during a 30-second time interval.

(2) The span drift during a 1-hour period shall be less than 2 percent of full-scale chart deflection on the lowest range used. The analyzer span is defined as the difference between the span-response and the zero-response. The span-response is defined as the mean response including noise to a span gas during a 30-second time interval.

(e) Calibration. Calibration procedures for analyzers are specified in subpart D of this part.

§1065.125 Hydrocarbon analyzers.

This section describes the requirements for flame ionization detectors (FIDs).

(a) Fuel the FID with a mixture of hydrogen in helium, and calibrate it using propane.

(b) You do not need to heat the FID for four-stroke SI engines. Heated FIDs are required for two-stroke SI engines. If you use a heated FID, you must keep the temperature below 200°C.

(c) An overflow sampling system is required for heated continuous FIDs. (An overflow system is one in which excess zero gas or span gas spills out of the probe when zero or span checks of the analyzer are made.)

(d) Premixing the FID fuel and burner air is not allowed.

(e) The FID must meet the applicable accuracy and precision specifications of ISO 8178.

§1065.130 NOx analyzers.

This section describes the requirements for chemiluminescent detectors (CLD).

(a) The CLD must meet the applicable accuracy and precision specifications of ISO 8178.

(b) The NO to NO2 converter must have an efficiency of at least 90 percent.

(c) Heated CLDs are not required for SI engine testing.

(d) An overflow sampling system is required for continuous CLDs. (An overflow system is one in which excess zero gas or span gas spills out of the probe when zero or span checks of the analyzer are made.)

§1065.135 CO and CO_2 analyzers.

This section describes the requirements for non-dispersive infrared absorption detectors (NDIR).

(a) The NDIR must meet the applicable accuracy and precision specifications of ISO 8178.

(b) The NDIR must meet the applicable quench and interference requirements of ISO 8178.

§1065.140 Smoke meters.

[RESERVED]

§1065.145 Flow meters.

(a) Flow meters must have accuracy and precision of ±2 percent of point or better, and be traceable to NIST standards.

(b) Flow measurements may be corrected for temperature and/or pressure, provided the temperature and pressure measurements have accuracy and precision of ±2 percent of point or better (absolute).

Subpart C—Test Fuels and Analytical Gases.

§1065.201 General requirements for test fuels.

(a) For all emission tests, use test fuels meeting the specifications in this subpart, unless the standard-setting part gives other directions. For any service accumulation on a test engine, if we do not specify a fuel, use the specified test fuel or a fuel typical of what you would expect the engine to use in service.

(b) We may require you to test the engine with each type of fuel it can use (for example, gasoline and natural gas).

(c) If you will produce engines that can run on a type of fuel (or mixture of fuels) we do not specify in this subpart, we will allow you to do testing with fuel that represents commercially available fuels of that type. However, we must approve your fuel's specifications before you may use it for emission testing.

(d) You may use a test fuel other than those we specify in this subpart if you do all of the following:

(1) Show that it is commercially available.

(2) Show that your engines will use only the designated fuel in service.

(3) Show that operating the engines on the fuel we specify would increase emissions or decrease durability.

(4) Get our written approval before you start testing.

(e) The test fuel specifications rely on standards established by the American Society for Testing and Methods, which have been incorporated by reference in §1065.1010.

§1065.205 Test fuel specifications for distillate diesel fuel.

[RESERVED]

§1065.210 Test fuel specifications for gasoline.

Gasoline test fuel must meet the specifications in Table 1 of §1065.210.

Table 1 of §1065.210—Gasoline Test Fuel Specifications

Item	Procedure	Value
Lead (organic), g/liter	ASTM D 3237	0.013 maximum
Phosphorous, g/liter	ASTM D 3231	0.005 maximum
Volatility (Reid Vapor Pressure), kPa	ASTM D 3231	60.0 to 63.4[1,2]
Sulfur, weight %	ASTM D 1266	0.08 maximum
Distillation Range:		
IBP, °C	ASTM D 86-97	23.9 - 35.0[2]
10% point, °C	ASTM D 86-97	48.9 - 57.2
50% point, °C	ASTM D 86-97	93.3 - 110.0
90% point, °C	ASTM D 86-97	148.9 - 162.8
EP, °C	ASTM D 86-97	212.8
Hydrocarbon composition:		
Olefins, volume %	ASTM D 1319-98	10 maximum
Aromatics, volume %	ASTM D 1319-98	35 minimum
Saturates	ASTM D 1319-98	Remainder

1. For testing unrelated to evaporative emissions, the specified range is 55.2 to 63.4 kPa.
2. For testing at altitudes above 1 219 m, the specified volatility range is 52 to 55 kPa and the specified

initial boiling point range is 23.9° to 40.6° C.

§1065.215 Test fuel specifications for natural gas.
Natural gas test fuel must meet the specifications in Table 1 of §1065.215

Table 1 of §1065.215—Natural Gas Test Fuel Specifications

Item	Procedure	Value (mole percent)
Methane	ASTM D 1945	89.0 minimum
Ethane	ASTM D 1945	4.5 maximum
C3 and higher	ASTM D 1945	2.3 maximum
C6 and higher	ASTM D 1945	0.2 maximum
Oxygen	ASTM D 1945	0.6 maximum
Inert gases: (sum of CO_2 and N_2)	ASTM D 1945	4.0 maximum
Odorant[1]	—	—

1. At ambient conditions, the fuel must have a distinctive odor detectable down to a concentration in air of not over one-fifth of the lower flammability limit.

§1065.220 Test fuel specifications for liquefied petroleum gas.
Liquefied petroleum gas test fuel must meet the specifications in Table 1 of §1065.220.

Table 1 of §1065.220—Liquefied Petroleum Gas Test Fuel Specifications

Item	Procedure	Value
Propane	ASTM D 2163	85.0 vol. percent minimum
Vapor pressure at 38° C	ASTM D 1267 or 2598[1]	14 bar maximum
Volatility residue: (evaporated temp., 35° C)	ASTM D 1837	-38° C maximum
Butanes	ASTM D 2163	5.0 vol. percent maximum
Butenes	ASTM D 2163	2.0 vol. percent maximum
Pentenes and heavier	ASTM D 2163	0.5 vol. percent maximum
Propene	ASTM D 2163	10.0 vol. percent maximum
Residual matter: residue on evap. of 100 ml oil stain observ.	ASTM D 2158	0.05 ml maximum pass[2]
Corrosion, copper strip	ASTM D 1838	No. 1 maximum
Sulfur	ASTM D 2784	80 ppm maximum
Moisture content	ASTM D 2713	pass
Odorant[3]	—	—

1. If these two test methods yield different results, use the results from ASTM D-1267.
2. The test fuel must not yield a persistent oil ring when 0.3 ml of solvent residue mixture is added to a filter paper, in 0.1 ml increments and examined in daylight after 2 minutes (see ASTM D-2158).
3. At ambient conditions, the fuel must have a distinctive odor detectable down to a concentration in air of not over one-fifth of the lower flammability limit.

§1065.240 Lubricating oils.
Lubricating oils that you use to comply with this part must be commercially available and representative of the oil that will be used with your in-use engines.

§1065.250 Analytical gases.
Analytical gases that you use to comply with this part must meet the accuracy and purity specifications of this section. You must record the expiration date specified by the gas supplier and may not use any gas after the expiration date.

(a) Pure gases. Use the "pure gases" in Table 1 of §1065.250.

Table 1 of §1065.250—Pure gas concentrations

Gas Type	Maximum Contaminant Concentrations				Oxygen Content
	Organic Carbon	Carbon Monoxide	Carbon Dioxide	Nitric Oxide (NO)	
Purified Nitrogen	1 ppmC	1 ppm	400 ppm	0.1 ppm	NA
Purified Oxygen	NA	NA	NA	NA	99.5-100.0 %
Purified Synthetic Air, or Zero-Grade Air	1 ppmC	1 ppm	400 ppm	0.1 ppm	18-21 %

(b) FID Fuel. For the flame ionization detector, use a hydrogen-helium mixture as the fuel. The mixture must contain 40 ± 2 percent hydrogen, and may contain no more than 1 ppmC of organic carbon or 400 ppm of CO2.

(c) Calibration and span gases. The following provisions apply to calibration and span gases:

(1) Use the following gas mixtures for calibrating and spanning your analytical instruments:

(i) Propane in purified synthetic air;

(ii) CO in purified nitrogen;

(iii) NO and NO_2 in purified nitrogen (the amount of NO_2 contained in this calibration gas must not exceed 5 percent of the NO content);

(iv) Oxygen in purified nitrogen

(v) CO_2 in purified nitrogen

(vi) Methane in purified synthetic air

(2) The calibration gases in paragraph (c)(1) of this section must be traceable to within one percent of NIST gas standards, or other gas standards we have approved. Span gases in paragraph (c)(1) of this section must be accurate to within two percent of true concentration, where true concentration refers to NIST gas standards, or other gas standards we have approved. All concentrations of calibration gas shall be given on a volume basis (volume percent or volume ppm).

(3) You may use gases for species other than those listed in paragraph (c)(1) of this section (such as methanol in air gases used for response factor determination), as long as they meet the following criteria.

(i) They are traceable to within ±2 percent of NIST gas standards, or other standards we have approved.

(ii) They remain within ±2 percent of the labeled concentration. Demonstrate this by using a quarterly measurement procedure with a precision of ±2 percent (two standard deviations), or other method that we approve. Your measurement procedure may incorporate multiple measurements. If the true concentration of the gas changes by more than two percent, but less than ten percent, you may relabel the gas with the new concentration.

(4) You may generate calibration and span gases using precision blending devices (gas dividers) to dilute gases with purified nitrogen or with purified synthetic air. The accuracy of the mixing device must be such that the concentration of the blended calibration gases is accurate to within ± 1.5 percent. This accuracy implies that primary gases used for blending must be known to an accuracy of at least ± 1 percent, traceable to NIST gas standards, or other gas standards we have approved. For each calibration incorporating a blending device, verify the blending accuracy between 15 and 50 percent of full scale. You may optionally check the blending device with an instrument that is linear by nature (for example, using NO gas with a CLD). Adjust the span value of the instrument with the span gas directly connected to the instrument. Check the blending device at the used settings to ensure that the difference between nominal values and measured concentrations at each point stays within ± 0.5 percent of the nominal value.

(d) Oxygen interference gases. Oxygen interference check gases are mixtures of oxygen, nitrogen, and propane. The oxygen concentration must be between 20 and 22 percent, and the propane concentration must be between 50 and 90 percent of the maximum value in the most typically used FID range. Independently measure the concentration of total hydrocarbons plus impurities by chromatographic analysis or by dynamic blending.

Subpart D—Analyzer and Equipment Calibrations.

§1065.301 Overview.

Calibrate all analyzers and equipment at least annually. The actual frequency must be consistent with good engineering judgement. We may establish other guidelines as appropriate. Perform the calibrations according to the specifications of one of the following sources:

(a) The recommendations of the manufacturer of the analyzers or equipment.

(b) 40 CFR part 86, subpart N.

§1065.305 Torque calibration.

Two techniques are allowed for torque calibration. Alternate techniques may be used if shown to yield equivalent accuracies. The NIST "true value" torque is defined as the torque calculated by taking the product of an NIST traceable weight or force and a sufficiently accurate horizontal lever arm distance, corrected for the hanging torque of the lever arm.

(a) The lever-arm dead-weight technique involves the placement of known weights at a known horizontal distance from the center of rotation of the torque measuring device. The equipment required is:

(1) Calibration weights. A minimum of six calibration weights for each range of torque measuring device used are required. The weights must be approximately equally spaced and each must be traceable to NIST weights. Laboratories located in foreign countries may certify calibration weights to local government bureau standards. Certification of weight by state government Bureau of Weights and Measures is acceptable. Effects of changes in gravitational constant at the test site may be accounted for if desired.

(2) Lever arm. A lever arm with a minimum length of 24 inches is required. The horizontal distance from the centerline of the engine torque measurement device to the point of weight application shall be accurate to within ±0.10 inches. The arm must be balanced, or the hanging torque of the arm must be known to within ±0.1 ft-lbs.

(b) The transfer technique involves the calibration of a master load cell (i.e., dynamometer case load cell). This calibration can be done with known calibration weights at known horizontal distances, or by using a hydraulically actuated precalibrated master load cell. This calibration is then transferred to the flywheel torque measuring device. The technique involves the following steps:

(1) A master load cell shall be either precalibrated or be calibrated per paragraph (a)(1) of this section with known weights traceable to NIST, and used with the lever arm(s) specified in paragraph (b)(2) of this section. The dynamometer should be either running or vibrated during this calibration to minimize static hysteresis.

(2) A lever arm(s) with a minimum length of 24 inches is (are) required. The horizontal distances from the centerline of the master load cell, to the centerline of the dynamometer, and to the point of weight or force application shall be accurate to within ±0.10 inches. The arm(s) must be balanced or the net hanging torque of the arm(s) must be known to within ±0.1 ft.-lbs.

(3) Transfer of calibration from the case or master load cell to the flywheel torque measuring device shall be performed with the dynamometer operating at a constant speed. The flywheel torque measurement device readout shall be calibrated to the master load cell torque readout at a minimum of six loads approximately equally spaced across the full useful ranges of both measurement devices. (Note that good engineering practice requires that both devices have approximately equal useful ranges of torque measurement.) The transfer calibration shall be performed in a manner such that the accuracy requirements of paragraph of this part for the flywheel torque measurement device readout be met or exceeded.

Subpart E—Engine preparation and service accumulation.

§1065.405 Preparing and servicing a test engine.

(a) If you are testing an emission-data engine for certification, make sure you have built it to represent production engines.

(b) Run the test engine, with all emission-control systems operating, long enough to stabilize emission levels. If you accumulate 50 hours of operation, you may consider emission levels stable without measurement.

(c) Do not service the test engine before you stabilize emission levels, unless we approve other maintenance in advance. This prohibition does not apply with respect to your recommended oil and filter changes for newly produced engines.

(d) Select engine operation for accumulating operating hours on your test engines to represent normal in-use engine operation for the engine family.

(e) If you need more than 50 hours to stabilize emission levels, record your reasons and the method you use to do this. Give us these records if we ask for them.

§1065.410 Service limits for stabilized test engines.

(a) After you stabilize the test engine's emission levels, you may do scheduled maintenance, other than during emission testing, as specified in the standard-setting part.

(b) You may not do any unscheduled maintenance to the test engine or its emission-control system or fuel system without our advance approval. Unscheduled maintenance includes any adjustment, repair, removal, disassembly, cleaning, or replacement of the test engine.

(1) We may approve unscheduled maintenance if all of the following occur:

(i) You determine that a part failure or system malfunction (or the associated repair) does not make the engine unrepresentative of production engines in the field and does not require anyone to access the combustion chamber.

(ii) Something clearly malfunctions (such as persistent misfire, engine stall, overheating, fluid leakage, or loss of oil pressure) and needs maintenance or repair.

(iii) You give us a chance to verify the extent of the malfunction through audible or visual signals before you do the maintenance.

(2) If we determine that a part's failure or a system's malfunction (or the associated repair) has made the engine unrepresentative of production engines, you may no longer use it as a test engine.

(3) You may not do unscheduled maintenance based on emission measurements from the test engine.

(4) Unless we approve beforehand, you may use equipment, instruments, or tools to identify bad engine components only if you specify they should be used for scheduled maintenance on production engines. In this case, you must also make them available at dealerships and other service outlets.

(c) If you do maintenance that might affect emissions, you must completely test systems for emissions before and after the maintenance unless we waive this requirement.

(d) If your test engine has a major mechanical failure that requires you to take the engine apart, you may no longer use it as a test engine.

§1065.420 Durability Demonstration.

Where durability testing is required by the standard-setting part, you must perform the service accumulation in a manner representative of the manner in which the engine is expected to operated in use. However, you may accumulate service hours using an accelerated schedule (e.g., using continuous operation). The following specifications also apply:

(a) Maintenance. (1) You may perform scheduled maintenance that you recommend to operators, but only if it is consistent with any applicable allowable maintenance restrictions of the standard-setting part.

(2) You may perform additional maintenance only if we approve it in advance, as specified in §1065.410(b).

(3) If your test engine has a major mechanical failure that requires you to take the engine apart, you may no

longer use it as a test engine.

(b) Emission measurements. (1) Emission testing to determine deterioration factors must be consistent with good engineering judgement and must be spaced evenly throughout the durability period.

(2) Emission tests must be perform according to the provisions of this part and the applicable provisions of the standard-setting part.

Subpart F—Running an emission test.

§1065.500 Overview of the engine dynamometer test procedures.

(a) The engine dynamometer test procedure measures the brake-specific emissions of hydrocarbons (total and nonmethane, as applicable), carbon monoxide, and oxides of nitrogen. To perform this test procedure, you first dilute exhaust emissions with ambient air and collect a continuous proportional sample for analysis, then analyze the composite samples (either in bags after the test or continuously during the test). The general test procedure consists of a test cycle made of one or more segments; check the standard-setting part for specific cycles. The segments are:

(1) Either a cold-start cycle (where emissions are measured) or a warm-up cycle (where emissions are not measured).

(2) A hot-start transient test (some test cycles may omit engine starting from the "hot-start" cycle).

(3) A steady-state test.

(b) Power is measured using the torque and rpm feedback signals from the dynamometer. This produces a brake kilowatt-hour value that leads to a calculation of brake-specific emissions (see Subpart G of this part).

(c) Prepare engines for testing according to the following provisions:

(1) When you test an engine or operate it for service accumulation, you need to use the complete engine, with all emission-control devices installed and functioning.

(2) For air-cooled engines, the fan must be installed.

(3) You may install additional accessories (for example, oil cooler, alternators, air compressors, etc.) or simulate their loading if they are typical of in-use operation. This loading must be applied during all testing operations, including mapping.

(4) The engine may be equipped with a production-type starter.

(5) Cool the engine in a way that will maintain the engine operating temperatures (for example, temperatures of intake air, oil, water, etc.) at approximately the same temperatures as would occur during normal operation. You may use auxiliary fans to maintain engine cooling during operation on the dynamometer. You may use rust inhibitors and lubrication additives, up to the levels recommended by the additive manufacturer. You may also use antifreeze mixtures and other coolants typical of those approved for use by the manufacturer.

(6) Use representative exhaust systems and air intake systems. Make sure that the exhaust restriction is between 80 and 100 percent of the recommended maximum specified exhaust restriction, and that the air inlet restriction is between that of a clean filter and the maximum restriction specification. The manufacturer is liable for emission compliance from the minimum in-use restrictions to the maximum restrictions specified by the manufacturer for that particular engine.

§1065.510 Engine mapping procedures.

(a) Power map. Perform an engine power map with the engine mounted on the dynamometer. Use the torque curve resulting from the mapping to convert the normalized torque values in the engine cycle to actual torque values for the test cycle. The minimum speed range is from the warm no-load idle speed to 105 percent of the maximum test speed. Since, the maximum test speed is determined from the power map, it may be necessary to perform a preliminary power map to determine the full mapping range. You may perform a preliminary power map during engine warmup. To map the engine, do the following things in sequence:

(1) Warm up the engine so oil and water temperatures vary by less than 2 percent for 2 minutes.

(2) Operate the engine at the warm no-load idle speed.

(3) Fully open the throttle.

(4) While maintaining wide-open throttle and full-load, maintain minimum engine speed for at least 15 seconds. Record the average torque during the last 5 seconds.

(5) In 100±20 rpm increments, determine the maximum torque curve for the full speed range. Hold each test point for 15 seconds, and record the average torque over the last 5 seconds.

(6) Fit all data points recorded with a cubic spline, Akima, or other technique we approve in advance. The resultant curve must be accurate to within ±1.0 ft-lbs of all recorded engine torques.

(b) Power map with continual rpm sweep. In place of paragraphs (a)(1) through (a)(4) of this section, you may do a a continual sweep of rpm. While operating at wide-open throttle, increase the engine speed at an average rate of 8±1

rpm/sec over the full speed range. Record speed and torque points at a rate of at least one point per second. Connect all points generated under this approach by linear interpolation.

(c) Alternate mapping. If you believe the above mapping techniques are unsafe or unrepresentative for any given engine or engine family, you may use alternate mapping techniques. These alternate techniques must satisfy the intent of the specified mapping procedures to determine the maximum available torque at all engine speeds that occur during the test cycles. Report deviations from the mapping techniques specified in this section for reasons of safety or representativeness. In no case, however, may you use descending continual sweeps of rpm for governed or turbocharged engines.

(d) Replicate Tests. You need not map an engine before each and every test. Remap an engine before a test in any of the following situations:

(1) An unreasonable amount of time has passed since the last map, as determined by good engineering judgment.

(2) The barometric pressure prior to the start of the cold-cycle test has changed more than 1 in. Hg from the average barometric pressure observed during the map.

(3) The engine has undergone physical changes or recalibration that might affect engine performance.

§1065.515 Transient test cycle generation.

(a) Denormalizing test cycles. The applicable test cycles are contained in the standard-setting parts. These cycles are comprised of second-by-second specifications for torque and speed. Both torque and speed are normalized in these cycles.

(1) Torque is normalized to the maximum torque at the speed listed with it. Therefore, to denormalize the torque values in the cycle, use the maximum torque curve for the engine in question. The generation of the maximum torque curve is described in §1065.510 of this chapter.

(2) To denormalize speed, use the following equation:

Actual rpm = (0.01)(%rpm)(Maximum test speed- warm idle speed) + warm idle speed.

(3) Paragraph (d) of this section describes the method of calculating maximum test speed.

(b) Example of the denormalization procedure. For an engine with maximum test speed of 3800 rpm and warm idle speed of 600 rpm, denormalize the following test point: percent rpm = 43, percent torque = 82.

(1) Calculate actual rpm. Actual rpm = (0.01)(43)(3800-600) + 600 = 1976

(2) Determine actual torque. Determine the maximum observed torque at 1976 rpm from the maximum torque curve. Then multiply this value (for example, 358 ft-lbs) by 0.82. This results in an actual torque of 294 ft-lbs.

(c) Cold-start enhancement devices. Proper operation of the engine's automatic cold-start enhancement device supersedes the zero-percent speed specified in the test cycles.

(d) Maximum test speed. Maximum test speed is used for all the emission testing we require. It occurs on the lug curve at the point farthest from the origin on a plot of power vs. speed. To find this speed, follow these steps:

(1) Generate the lug curve. Before testing an engine for emissions, generate data points for maximum measured brake power with varying engine speed (see §1065.510). These data points form the lug curve.

(2) Normalize the lug curve. To normalize the lug curve, do three things:

(i) Identify the point (power and speed) on the lug curve where maximum power occurs.

(ii) Normalize the power values of the lug curve— divide them by the maximum power and multiply the resulting values by 100.

(iii) Normalize the engine speed values of the lug curve— divide them by the speed at which maximum power occurs and multiply the resulting values by 100.

(3) Determine maximum test speed. Calculate the maximum test speed from the following speed-factor analysis.

(i) For a given power-speed point, the speed factor is the normalized distance to the power-speed point from the zero-power, zero-speed point. Compute the speed factor's value:

$$Speed\ \ factor = \sqrt{(power)^2 + (speed)^2}$$

(ii) Determine the maximum value of speed factors for all the power-speed data points on the lug curve. Maximum test speed is the speed at which the speed factor's maximum value occurs. Note that this maximum test speed is the 100-percent speed point for normalized transient duty cycles.

(4) Constant-speed engines. For constant-speed engines, maximum test speed is the same as the engine's maximum in-use operating speed.

(e) Intermediate test speed. Determine intermediate test speed with the following provisions:

(1) If peak torque speed is between 60 to 75 percent of maximum test speed, the intermediate speed point is at that same speed.

(2) If peak torque speed is less than 60 percent of maximum test speed, the intermediate speed point is at 60 percent of maximum test speed.

(3) If peak torque speed is greater than 75 percent of maximum test speed, the intermediate speed point is at 75 percent of maximum test speed.

§1065.520 Engine starting, restarting, and shutdown.

Applicable test cycles may contain requirements to start or shut down the engine. This section specifies how to do that.

(a) Engine starting. Start the engine according to the manufacturer's recommended starting procedure in the owner's manual, using either a production starter motor or the dynamometer. The speed at which the engine is cranked (motored) with the dynamometer should be equal to the typical in-use cranking speed (nominal speed ±10 percent) with a fully charged battery. The time the dynamometer takes to accelerate the engine to cranking speed should be equal (nominal ±0.5 seconds) to the time required with a starter motor. Terminate motoring by the dynamometer within one second of starting the engine. The free-idle period of the cycle begins when you determine that the engine has started.

(1) If the engine does not start after 15 seconds of cranking, cease cranking and determine the reason for the failure to start. Turn off the gas flow measuring device (or revolution counter) on the constant-volume sampler (and the hydrocarbon integrator when measuring hydrocarbons continuously) during this diagnostic period. Also, either turn off the CVS or disconnect the exhaust tube from the tailpipe during the diagnostic period. If failure to start is an operational error, reschedule the engine for testing (this may require soaking the engine if a cold-start is required for the test).

(2) If longer cranking times are necessary, you may use them instead of the 15-second limit, as long as the owner's manual and the service repair manual describe the longer cranking times as normal.

(3) If an engine malfunction causes a failure to start, you may take corrective action of less than 30 minutes duration and continue the test. Reactivate the sampling system at the same time cranking begins. When the engine starts, begin the timing sequence. If an engine malfunction causes a failure to start and the engine cannot be restarted, the test is void.

(c) Engine stalling. Respond to engine stalling according the following provisions:

(1) If the engine stalls during the warm-up period, the initial idle period of test, or the steady-state segment, you may restart the engine immediately using the appropriate starting procedure and continue the test.

(2) If the engine stalls anywhere else during the test, the test is void.

(d) Engine shutdown. Shut the engine down according to the manufacturer's specifications.

§1065.525 Engine dynamometer test run.

Take the following steps for each test:

(a) Prepare the engine, dynamometer, and sampling system. Change filters or other replaceable items and leak check as necessary.

(b) If you are using bag samples, connect evacuated sample collection bags to the dilute exhaust and dilution air sample collection systems.

(c) Attach the CVS to the engine exhaust system any time prior to starting the CVS.

(d) Start the CVS (if not already started), the sample pumps, the engine cooling fan(s), and the data collection system. Preheat the heat exchanger of the constant-volume sampler (if used) and the heated components of any continuous sampling system(s) to their designated operating temperatures before the test begins.

(e) Adjust the sample flow rates to the desired flow rates and set the CVS gas flow measuring devices to zero.

CFV-CVS sample flow rate is fixed by the venturi design.
(f) Start the engine if engine starting is not part of the test cycle specified in the standard-setting part.
(g) Run the test cycle specified in the standard-setting part and collect the test data.
(h) As soon as practical after the test cycle is completed, analyze the bag samples.

§1065.530 Test cycle validation criteria.
(a) Steady-state emission testing. Engine speeds and/or loads may not deviate from the set point more than ±2 percent of point during the sampling period for a valid test.
(b) Transient emission testing performed by EPA. Emission tests not meeting the specifications of this paragraph are not considered to be in accordance with the test cycle requirements of the standard-setting part, except where the cause of the failure to meet these specifications is determined to be related to the engine rather than the test equipment.

(1) Shifting feedback signals. To minimize the biasing effect of the time lag between the feedback and reference cycle values, you may advance or delay the entire engine speed and torque feedback signal sequence with respect to the reference speed and torque sequence. If the feedback signals are shifted, you must shift both speed and torque the same amount in the same direction.
(2) Brake kilowatt-hour calculation. Calculate the brake kilowatt-hour for each pair of engine feedback speed and torque values recorded. Also calculate the reference brake kilowatt-hour for each pair of engine speed and torque reference values. Calculations must be done to five significant figures.
(3) Regression line analysis. Perform regression analysis to calculate validation statistics according to the following paragraphs:

(i) Perform linear regressions of feedback value on reference value for speed, torque, and brake power on 1 Hz data after the feedback shift has occurred (see paragraph (b)(1) of this section). Use the method of least squares, with the best fit equation having the form:
$y = mx + b$
Where:
y = The feedback (actual) value of speed (rpm), torque (ft-lbs), or brake power.
m = Slope of the regression line.
x = The reference value (speed, torque, or brake power).
b = The y-intercept of the regression line.
(ii) Calculate the standard error of estimate (SE) of y on x and the coefficient of determination (r^2) for each regression line.
(iii) For the test to be considered valid, the slope, intercept, standard error, and coefficient of determination must meet the criteria in Table 1 of §1065.530 and the integrated brake kilowatt-hour of the feedback cycle does must be within 5 percent of the integrated brake kilowatt-hour of the reference cycle.. Individual points may be deleted from the regression analyses consistent with good engineering judgement.

Table 1 of §1065.530
Statistical Criterial for Test Cycle Validation

	Speed	**Torque**	**Power**
Standard error of the estimate of Y on X (SE)	100 rpm	15 percent of maximum torque from power map	10 percent of maximum power from power map
Slope of the regression line (m)	0.980 to 1.020	0.880 to 1.030	0.880 to 1.030
Coefficient of determination (r^2)	$r^2 \geq 0.970$	$r^2 \geq 0.900$	$r^2 \geq 0.900$
Y intercept of the regression line (b)	$\|b\| \leq 40$ rpm	$\|b\| \leq 5.0$ percent of maximum torque from power map	$\|b\| \leq 3.0$ percent of maximum torque from power map

(c) Transient testing performed by manufacturers. Emission tests meeting the specifications of paragraph (b) of this section are considered to be in accordance with the test cycle requirements of the standard-setting part. A manufacturer may choose to use a dynamometer not capable of meeting the specifications of paragraph (b) of this

section.

Subpart G—Data analysis and calculations.

§1065.601 Overview.
This subpart describes how to use the responses on the anlayzers and other meters to calculate final gram per kilowatt-hour emission rates.

§1065.605 Required records.
Retain the following information for each test:
(a) Test number.
(b) System or device tested (brief description).
(c) Date and time of day for each part of the test schedule.
(d) Test results.
(e) Operator's name.
(f) Engine: ID number, manufacturer, model year, emission standards, engine family, basic engine description, fuel system, engine code, and idle rpm, as applicable.
(g) Dynamometer: Dynamometer identification, records to verify compliance with the duty cycle requirements of the test.
(h) Gas analyzers: Analyzer bench identification, analyzer ranges, recordings of analyzer output during zero, span, and sample readings.
(i) Recorder charts: Test number, date, identification, operator's name, and identification of the measurements recorded.
(j) Test cell barometric pressure, ambient temperature, and humidity as required. (Some test systems may require continuous measurements, others may require a single measurement, or measurements before and after the test.)
(k) Temperatures: Records to verify compliance with the ambient temperature requirements throughout the test procedure.
(l) CFV-CVS: Total dilute exhaust volume (Vmix) for each phase of the exhaust test.
(m) PDP-CVS: Test measurements for calculating the total dilute exhaust volume (Vmix), and the Vmix for each phase of the exhaust test.
(n) The humidity of the dilution air. Note: If you do not use conditioning columns, this measurement is not necessary. If you use conditioning columns and take the dilution air from the test cell, you may use the ambient humidity for this measurement.

§1065.610 Bag sample analysis.
(a) Zero the analyzers and obtain a stable zero reading. Recheck after tests.
(b) Introduce span gases and set instrument gains. To avoid errors, span and calibrate at the same flow rates used to analyze the test sample. Span gases should have concentrations equal to 75 to 100 percent of full scale. If gain has shifted significantly on the analyzers, check the calibrations. Show actual concentrations on the chart.
(c) Check zeroes; repeat the procedure in paragraphs (a) and (b) of this section if necessary.
(d) Check flow rates and pressures.
(e) Measure HC, CO, and NOx concentrations of samples.
(f) Check zero and span points. If the difference is greater than 2 percent of full scale, repeat the procedure in paragraphs (a) through (e) of this section.

§1065.615 Bag sample calculations.

(a) Calculate the dilution factor. The dilution factor is the ratio of the total volume of the raw exhaust to the total volume of the diluted exhaust. It is calculated as 134,000 divided by the sum of the diluted ppmC concentrations of carbon-containing compounds in the exhaust; that is:

$$DF = 134{,}000/(CO2_{sample}+THC_{sample}+CO_{sample}),$$

where $CO2_{sample}$ and CO_{sample} are expressed as ppm, and THC_{sample} is expressed as ppmC.
(b) Calculate mass emission rates (g/test) for the transient segment using the following general equation:

emission rate = (total dilute exhaust volumetric flow)(ppm)(density factor)/10^6

$M_x = (V_{mix})(C_i)(f_{di})/10^6$

Where:

(1)M_x = mass emission rate in g/test segment.

(2)V_{mix} = total dilute exhaust volumetric flow in m^3 per test segment.

(3) C_i = the concentration of species i, in ppm or ppmC, corrected for background contribution according to the following equation:

$C_i = C_{sample} - C_{background} [1 - (1/DF)]$

Where:

(i) C_{sample} = concentration of species i in the diluted exhaust sample, in ppm or ppmC.

(ii) $C_{background}$ = concentration of species i in the dilution air background sample, in ppm or ppmC.

(iii) DF = dilution factor, as calculated in paragraph (a) of this section.

(4) f_{di} = The density factor for species i. The density factors are:

(i) 576.8 g/m^3 for THC

(ii) 1913 g/m^3 for NOx

(iii) 1164 g/m^3 for CO

(c) Calculate total brake work done during the emissions sampling period of each segment or mode.

(d) Determine the time duration of the emission sampling period.

(e) Calculate emissions in g/kW-hr by dividing the mass emission rate by the total brake work and the duration of the emission sampling period.

Subpart H—Particulate measurements.

[RESERVED]

Subpart I—Testing with oxygenated fuels.

[RESERVED]

Subpart J—Field Testing.

§1065.901 Applicability.

(a) The test procedures in this subpart measure brake-specific emissions from engines while they remain installed in vehicles or equipment in the field.

(b) These test procedures apply to your engines as specified in the standard-setting part.

§1065.905 General provisions.

(a) Unless the standard-setting part specifies deviations from the provisions of this subpart, testing conducted under this subpart must conform to all of the provisions of this subpart.

(b) Testing conducted under this subpart may include any or all normal in-use operation of the engine.

§1065.910 Measurement accuracy and precision.

(a) Measurement systems used for in-use testing must be accurate to within ±5 percent compared to engine dynamometer testing conducted according to the test procedures of this part that are applicable for your engine. These systems must also have a precision of ±5 percent or better. Determine accuracy and precision of an in-use system by simultaneously measuring emissions using the engine-dynamometer test procedures of this part and the in-use system. To have a statistically valid sample, measure emissions during at least 3 tests each for at least 3 different engines. You must conduct these verification tests using the test cycle specified in the standard-setting part, unless we approve a different test cycle.

(1) A system must meet the following conditions to be considered sufficiently accurate:

(i) The correlation coefficient (r) for a least-squares linear fit that includes the origin must be 0.95 or higher.

(ii) The average ratio (for all tests) of the emission rate from the in-use system divided by the emission rate from the dynamometer procedure must be between 0.97 and 1.05.

(2) For a system to be considered sufficiently precise, the average coefficient of variance for all engines must be 5 percent or less for each pollutant. Note: Increasing the length of the sampling period may be an effective way to improve precision.

(b) Measurement systems that conform to the provisions of sections 1065.915 through 1065.950 are considered to be in compliance with the accuracy and precision requirements of paragraph (a) of this section.

§1065.915 Equipment specifications for SI engines.

This section describes equipment you may use to measure in-use emissions. You may use other equipment and measurement systems that conform to the requirements of §§1065.905 and 1065.910.

(a) The primary components of the in-use measurement system are a mass air flow sensor, a portable FID, a zirconia-based NOx sensor, a zirconia-based air/fuel ratio sensor, and a portable NDIR analyzer.

(1) The mass air flow sensor must meet the requirements of §1065.930.

(2) The portable FID must meet the requirements of §1065.935.

(3) The NOx and air/fuel sensors must meet the requirements of §1065.940

(4) The NDIR analyzer must meet the requirements of §1065.941.

(b) You must measure the following parameters continuously at a rate of 3 Hz or higher and store the data electronically:

(1) THC, NOx, CO concentrations.

(2) Air/fuel ratio.

(3) Intake air flow rate.

(4) Engine speed.

(5) Parameters used to calculate torque.

(c) You must minimize sample line length for any analyzers that require a physical sample be drawn from the exhaust to the analyzer (i.e., THC and CO analyzers). You must draw these samples at a constant flow rate. In no case may you use any combination of sample line length and sample flow rate that would result in the length of time necessary for the analyzer to reach 90 percent of its final response after a step change to the input concentration at

the opening of the sample probe being greater than 10 seconds. For residence time delays between 1 and 10 seconds, you must correct the measurements to be consistent with the engine speed, torque, and air intake data. You may also correct other measurements with less than 1 second lags.
(d) The sample probes and sensors can be inserted into the exhaust pipe, or mounted in an exhaust extension that is connected to the exhaust pipe with negligible leaking. The sample probes and sensors must be located sufficiently close to the center line of the exhaust pipe to minimize boundary layer effects from the wall. [MORE ABOUT PROBE DESIGN]

§1065.920 Equipment setup and test run for SI engines.
This section describes how to set up the equipment specified in §1065.915, and how to use it to measure in-use emissions from SI engines.
(a) Inspect the vehicle or equipment to determine whether it meets any applicable requirements of the standard-setting part. This may include requirements related to model year, accumulated hours of operation, fuel specifications, maintenance history, engine temperatures, etc.
(b) Perform calibrations as specified in this subpart. In the field, this generally will require only zeroing and spanning the instruments. However, each instrument must have been fully calibrated according to the instrument manufacturer's specifications. Nonlinear calibrations generated previously from the full calibration may be used after zeroing and spanning the instruments. Spanning can be performed using a single gas bottle, consistent with good engineering practice, and provided that stability of the span mixture has been demonstrated.
(c) Connect the data recorder (with any necessary signal interpreters or converters) to the engine's electronic control module (ECM).
(d) Disconnect the air intake system as necessary to attach the mass air flow sensor. Reconnect the system after attaching the mass air flow sensor.
(e) Attach the sample extension to the exhaust outlet.
(f) Turn on instruments and allow them to warm up as necessary.
(g) Begin sampling. You do not need to begin recording the data at this point.
(h) Begin operating the vehicle or equipment in a normal manner. (Note: We may require you to operate the vehicle or equipment in a specific manner.)
(i) Begin recording engine speed, engine torque (or surrogate), intake air flow, emissions data (THC, NOx, CO, air/fuel ratio), and time. This is the beginning of the sampling period.
(j) Continue recording data and operating the vehicle or equipment in a normal manner until the end of the sampling period. The length of the sampling period is based on good engineering practice, the precision requirements of §1065.910, and applicable limits in the standard-setting part.
(k) You may measure background concentrations and correct measured emission values accordingly. However, if any background corrections are equivalent to 5 percent or more of the maximum emissions allowed by the appliacble standard, the test shall be voided and repeated in an environment with lower background concentrations.

§1065.925 Calculations.
(a) [Reserved].
(b) Convert emission analyzer data to instantaneous concentrations in ppm (ppmC for the FID).
(c) Calculate instantaneous exhaust volumetric flow rates in m^3/hr:
exhaust flow rate = (intake air flow rate)(1-f/a)
(d) Calculate instantaneous emission rates (g/hr) using the following general equation:
emission rate = (exhaust volumetric flow rate)(ppm)(density factor)/10^6
The density factors are:
(1) 576.8 g/m^3 for THC
(2) 1 913 g/m^3 for NOx
(3) 1 164 g/m^3 for CO
(e) Integrate instantaneous emission rates for the entire specified sample period.
(f) Determine instantaneous brake torque and speed.
(g) Calculate instantaneous brake power.
(h) Integrate instantaneous brake power for the entire specified sample period.

(i) Divide the integrated emission rates by the integrated brake power. These are your final brake-specific emission rates.

§1065.930 Specifications for mass air flow sensors.

(a) Measure the intake air flow using the engine's mass air flow sensor. If the engine is not equipped with a mass air flow sensor, you need to install one.

(b) The sensor design must have an accuracy and precision of ±5 percent under steady-state laboratory conditions.

(c) The sensor must reach at least 90 percent of its final response within 0.3 seconds after any step change to the flow rate greater than or equal 80 percent of full scale.

(d) Calibrate the sensor according to good engineering practice. Prior to testing verify for each engine that the sensor accurately reads the idle intake air flow rate based on measured manifold temperature (T_M) and pressure (P_M). Use the following equation:

Intake air flow = (displacement)(rpm)(volumetric efficiency)(P_M/101.3 kPa)(293.15/T_M)

§1065.935 Specifications for THC analyzers.

(a) Use a flame ionization detector (FID).

(b) The analyzer must have an accuracy and precision of ±2 percent of point or better under steady-state laboratory conditions.

(c) The analyzer must reach at least 90 percent of its final response within 1.0 second after any step change to the input concentration greater than or equal 80 percent of full scale.

(d) Zero and span the analyzer daily during testing. Calibrate it according to the analyzer manufacturer's specifications.

§1065.940 Specifications for NOx and air/fuel sensors.

(a) Use stabilized zirconia-based sensors.

(b) The sensors must have an accuracy and precision of ±2 percent of point or better under steady-state laboratory conditions.

(c) The sensors must reach at least 90 percent of its final response within 1.0 second after any step change to the input concentration greater than or equal 80 percent of full scale.

(d) The sensors must be zeroed and spanned daily during testing, and must calibrated according to the sensor manufacturer's specifications.

§1065.945 Specifications for CO analyzers.

(a) Use a non-dispersive infrared (NDIR) detector that is compensated for CO2 and water interference.

(b) The analyzer must have an accuracy and precision of ±2 percent of point or better under steady-state laboratory conditions.

(c) The analyzer must reach at least 90 percent of its final response within 5.0 second after any step change to the input concentration greater than or equal 80 percent of full scale.

(d) The analyzer must be zeroed and spanned daily during testing, and must calibrated according to the analyzer manufacturer's specifications.

§1065.950 Specifications for speed and torque measurement.

(a) Determine torque from a previously determined relationship of torque and engine speed, throttle position, and/or manifold absolute pressure. Torque estimates must be between 85 percent and 105 percent of the true value. You can demonstrate compliance with this accuracy requirement using steady-state labortory data.

(b) Measure speed from the engine's electronic control module. Speed estimates must be within ±5 rpm of the true value.

Subpart K—Definitions and Other Reference Information

§1065.1000 Definitions.

The following definitions apply to this part. The definitions apply to all subparts unless we note otherwise. All undefined terms have the meaning the Act gives to them.

Accuracy means the maximum difference between a measured or calculated value and the true value, where the true value is determined by NIST.

Act means the Clean Air Act, as amended, 42 U.S.C. 7401 et.seq.

Adjustable parameter means any device, system, or element of design that someone can adjust (including those which are difficult to access) and that, if adjusted, may affect emissions or engine performance during emission testing or normal in-use operation.

Aftertreatment means relating to any system, component, or technology mounted downstream of the exhaust valve or exhaust port whose design function is to reduce exhaust emissions.

Auxiliary emission-control device means any element of design that senses temperature, engine rpm, motive speed, transmission gear, atmospheric pressure, manifold pressure or vacuum, or any other parameter to activate, modulate, delay, or deactivate the operation of any part of the emission-control system. This also includes any other feature that causes in-use emissions to be higher than those measured under test conditions, except as we allow under this part.

Calibration means the set of specifications and tolerances specific to a particular design, version, or application of a component or assembly capable of functionally describing its operation over its working range.

Certification means obtaining a certificate of conformity for an engine family that complies with the emission standards and requirements in this part.

Compression-ignition means relating to a type of reciprocating, internal-combustion engine that is not a spark-ignition engine.

Constant-speed engine means an engine governed to operate only at its rated speed.

Designated Officer means the Manager, Engine Compliance Programs Group (6403-J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., Washington, DC 20460.

Emission-control system means any device, system, or element of design that controls or reduces the regulated emissions from an engine.

Emission-data engine means an engine that is tested for certification.

Emission-related maintenance means maintenance that substantially affects emissions or is likely to substantially affect emissions deterioration.

Engine means an engine to which this part applies. For equipment subject to this part and regulated under equipment-based standards, the term engine in this part shall be interpreted to include equipment.

Engine-based means having emission standards related to measurements using an engine dynamometer, in units of grams of pollutant per kilowatt-hour.

Engine family means a group of engines with similar emission characteristics, as specified in the standard-setting part.

Engine manufacturer has the meaning given in section 216(1) of the Act. In general, this term includes any person who manufactures an engine for sale in the United States or otherwise introduces a new engine into commerce in the United States. This includes importers. For equipment subject to this part and regulated under equipment-based standards, the term engine manufacturer in this part shall be interpreted to include equipment manufacturers.

Equipment-based means having emission standards related to measurements from an engine installed in a vehicle using a chassis dynamometer, in units of grams of pollutant per kilometer.

Good engineering judgment has the meaning we give it in §1068.005 of this chapter.

Fuel system means all components involved in transporting, metering, and mixing the fuel from the fuel tank to the combustion chamber(s), including the fuel tank, fuel tank cap, fuel pump, fuel filters, fuel lines, carburetor or fuel-injection components, and all fuel-system vents.

Identification number means a unique specification (for example, model number/serial number combination) that allows someone to distinguish a particular engine from other similar engines.

Maximum test torque means the torque output observed with the maximum fueling rate possible at a given speed.

Nonmethane hydrocarbons means the sum of all hydrocarbon species measured by a FID except methane, expressed with an assumed mass 13.876 grams per mole of carbon atoms.

Nonroad means relating to nonroad engines.

Nonroad engine has the meaning given in §89.2 of this chapter. In general this means all internal combustion engines except motor vehicle engines, stationary engines, or engines used solely for competition.

Oxides of nitrogen means the oxides of nitrogen measured by the specified test equipment. Specifically, this means nitric oxide (NO) and nitrogen dioxide (NO_2). Oxides of nitrogen are expressed quantitatively as if the NO were in the form of NO_2 (assume a molecular weight for oxides of nitrogen equivalent to that of NO_2).

Precision means two times the coefficient of variance of multiple measurements, except where specified otherwise.

Revoking a certificate of conformity means discontinuing the certificate for an engine family. If we revoke a certificate, you must apply for a new certificate before continuing to produce the affected engines. This does not apply to engines you no longer possess.

Round means to round numbers according to ASTM E29-93a, which is incorporated by reference (see §1065.1010), unless otherwise specified.

Scheduled maintenance means adjusting, repairing, removing, disassembling, cleaning, or replacing components or systems that is periodically needed to keep a part from failing or malfunctioning. It also may mean actions you expect are necessary to correct an overt indication of failure or malfunction for which periodic maintenance is not appropriate.

Spark-ignition means relating to a 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.

Standard-setting part means the part in the Code of Federal Regulations that defines emission standards for a particular engine (see §1065.001(a)).

Stoichiometry means the proportion of a mixture of air and fuel such that the fuel is fully oxidized with no remaining oxygen. For example, stoichiometric combustion in gasoline engines typically occurs at an air-fuel mass ratio of about 14.7.

Suspending a certificate of conformity means temporarily discontinuing the certificate for an engine family. If we suspend a certificate, you may not sell engines from that engine family unless we reinstate the certificate or approve a new one.

Test engine means an engine in a test sample.

Test sample means the collection of engines selected from the population of an engine family for emission testing.

Total Hydrocarbon (THC) means the sum of all hydrocarbon species measured by a FID, expressed with an assumed mass 13.876 grams per mole of carbon atoms.

Total Hydrocarbon Equivalent means the sum of the carbon mass contributions of non-oxygenated hydrocarbons, alcohols and aldehydes, or other organic compounds that are measured separately as contained in a gas sample, expressed as petroleum-fueled engine hydrocarbons. The hydrogen-to-carbon ratio of the equivalent hydrocarbon is 1.85:1.

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands.

Voiding a certificate of conformity means invalidating a certificate, so all the engines produced under that engine family for that model year are considered noncompliant. If we void a certificate, you are liable for each engine produced under the certificate and may face civil or criminal penalties or both.

Voiding an exemption means invalidating an exemption, so all the engines produced under that exemption are considered uncertified (or nonconforming). If we void an exemption, you are liable for each engine produced under the exemption and may face civil or criminal penalties or both. You may not produce any additional engines using the exemption.

§1065.1005 Symbols, acronyms, and abbreviations.
The following symbols, acronyms, and abbreviations apply to this part.

"	inches
ASTM	American Society for Testing and Materials
cc	cubic centimeters
CFV	critical-flow venturi
CI	compression-ignition
CLD	chemiluminescent detector
CO	carbon monoxide
CO_2	carbon dioxide
CVS	constant-volume sampler
EFC	
EPA	Environmental Protection Agency
FID	flame ionization detector
g/kW-hr	grams per kilowatt-hour
IBP	initial boiling point
ISO	International Organization for Standardization
kPa	kilopascal
LPG	liquefied petroleum gas
m	meters
mm Hg	millimeters of mercury
NDIR	nondispersive infrared
NIST	National Institute for Standards and Testing
NMHC	nonmethane hydrocarbons
NO	nitric oxide
NO_2	nitrogen dioxide
NOx	oxides of nitrogen (NO and NO_2)
O_2	oxygen
PDP	positive-displacement pump
ppm	parts per million
rpm	revolutions per minute
SAE	Society of Automotive Engineers
SI	spark-ignition
THC	total hydrocarbon
THCE	total hydrocarbon equivalent
U.S.C.	United States Code
° C	degrees Celsius

§1065.1010 Reference materials.
We have incorporated by reference the documents listed in this section. The Director of the Federal Register approved the incorporation by reference as prescribed in 5 U.S.C. 552(a) and 1 CFR part 51. Anyone may inspect copies at:

U.S. EPA
OAR, Air and Radiation Docket and Information Center
401 M Street, SW
Washington, DC 20460

or at

Office of the Federal Register
800 N. Capitol St. NW, 7th Floor, Suite 700

Washington, DC 20001

(1) ASTM material. Table 1 of §1065.1010 lists material from the American Society for Testing and Materials that we have incorporated by reference. The first column lists the number and name of the material. The second column lists the sections of this part where we reference it. The second column is for information only and may not include all locations. Anyone may receive copies of these materials from:

American Society for Testing and Materials
1916 Race St.
Philadelphia, PA 19103

Table 1 of §1065.1010—ASTM Materials

Document number and name	40 CFR part 1065 reference
ASTM D 86-97: "Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure"	
ASTM D 93-97: "Standard Test Methods for Flash-Point by Pensky-Martens Closed Cup Tester"	
ASTM D 129-95: "Standard Test Method for Sulfur in Petroleum Products (General Bomb Method)"	
ASTM D 287-92: "Standard Test Method for API Gravity of Crude Petroleum and Petroleum Products" (Hydrometer Method)	
ASTM D 445-97: "Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)"	
ASTM D 613-95: "Standard Test Method for Cetane Number of Diesel Fuel Oil"	
ASTM D 1319-98: "Standard Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption"	
ASTM D 2622-98: "Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry"	
ASTM D 5186-96: "Standard Test Method for "Determination of the Aromatic Content and Polynuclear Aromatic Content of Diesel Fuels and Aviation Turbine Fuels By Supercritical Fluid Chromatography"	
ASTM E 29-93a: "Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications"	

(2) ISO material. Table 2 of §1065.1010 lists material from the International Organization for Standardization that we have incorporated by reference. The first column lists the number and name of the material. The second column lists the section of this part where we reference it. The second column is for information only and may not be all-inclusive. Anyone may receive copies of these materials from:

International Organization for Standardization
Case Postale 56,
CH-1211 Geneva 20
Switzerland

Table 2 of §1065.1010—ISO Materials

Document number and name	part 1048 reference

(3) SAE material. ??

§1065.1015 Confidential information.

(a) Clearly show what you consider confidential by marking, circling, bracketing, stamping, or some other method. We will store your confidential information as described in 40 CFR part 2. Also, we will disclose it only as specified in 40 CFR part 2.

(b) If you send us a second copy without the confidential information, we will assume it contains nothing confidential whenever we need to release information from it.

(c) If you send us information without claiming it is confidential, we may make it available to the public without further notice to you, as described in §2.204 of this chapter.

PART 1068— GENERAL COMPLIANCE PROVISIONS FOR NONROAD PROGRAMS

Subpart A—Applicability and Miscellaneous Provisions

Subpart B—Prohibited Acts and Related Requirements

Subpart C—Exemptions

Authority: 42 U.S.C. 7401 - 7671(q)

Subpart A—Applicability and Miscellaneous Provisions

§1068.001 Does this part apply to me?

(a) The provisions of this part apply to everyone with respect to the following engines or equipment using the following engines:

(1) Large nonroad spark-ignition engines we regulate under 40 CFR part 1048.

(2) Snowmobiles, all-terrain vehicles, and off-highway motorcycles we regulate under 40 CFR part 1051.

(b) This part does not apply to any of the following engine or vehicle categories:

(1) light-duty motor vehicles (see 40 CFR part 86).

(2) heavy-duty motor vehicles and motor vehicle engines (see 40 CFR part 86).

(3) aircraft engines (see 40 CFR part 87).

(4) locomotive engines (see 40 CFR part 92).

(5) land-based nonroad diesel engines (see 40 CFR part 89).

(6) marine diesel engines (see 40 CFR parts 89 and 94)

(7) marine outboard and personal watercraft engines (see 40 CFR part 91).

(8) small nonroad spark-ignition engines (see 40 CFR part 90).

(c) For equipment subject to this part and regulated under equipment-based standards, interpret the term "engine" in this part to include equipment (see §1068.025).

(d) Follow the provisions of the standard-setting part if they are different than any of the provisions in this part.

§1068.005 How must engine manufacturers apply good engineering judgment?

(a) You must use good engineering judgment for decisions related to any requirements under this chapter. This includes your applications for certification, any testing you do to show that your production-line or in-use engines comply with requirements that apply to them, and how you select, categorize, determine, and apply these requirements.

(b) If we send you a written request, you must give us a written description of the engineering judgment in question. Respond within 15 working days of receiving our request unless we allow more time.

(c) We may reject your decision if it is not based on good engineering judgment or is otherwise inconsistent with the requirements that apply, based on the following provisions:

(1) We may suspend, revoke, or void a certificate of conformity if we determine you deliberately used incorrect information or overlooked important information, that you did not decide in good faith, or that your decision was not rational.

(2) If we believe a different decision would better reflect good engineering judgment, but none of the provisions of paragraph (c)(1) of this section apply, we will tell you of our concern (and its basis). You will have 30 days to respond to our concerns, or more time if we agree that you need it to generate more information. After considering your information, we will give you a final ruling. If we conclude that you did not use good engineering judgment, we may reject your decision and apply the new ruling to similar situations as soon as possible.

(d) We will tell you in writing of the conclusions we reach under paragraph (c) of this section and explain our reasons for them.

(e) If you disagree with our conclusions, you may file a request for a public hearing with the Designated Officer as described in subpart F of this part. In your request, specify your objections, include data or supporting analysis, and get your authorized representative's signature. If we agree that your request raises a substantial factual issue, we will hold the hearing according to subpart F of this part.

§1068.010 How do I request EPA to keep my information confidential

(a) Clearly identify any information you consider confidential by marking, circling, bracketing, stamping, or some other method. We will store your confidential information as described in 40 CFR part 2. Also, we will disclose it only as specified in 40 CFR part 2. This procedure applies equally to the Environmental Appeals Board.

(b) If you send us a second copy without the confidential information, we will assume it contains nothing confidential whenever we need to release information from it.
(c) If you send us information without claiming it is confidential, we may make it available to the public without further notice to you, as described in §2.204 of this chapter.

§1068.015 Who is authorized to represent the Agency?
The Administrator of the Environmental Protection Agency or any official to whom the Administrator has delegated specific authority may represent the Agency. For more information, ask for a copy of the relevant sections of the EPA Delegation Manual from the Designated Officer.

§1068.020 May EPA enter my facilities for inspections?
(a) If you are a certificate holder, we may inspect your engines, testing, manufacturing processes, engine storage facilities (including port facilities for imported engines), or records to enforce the provisions of this chapter. Inspectors will have authorizing credentials and will limit inspections to reasonable times—usually, normal operating hours.
(b) If we come to inspect, we may or may not have a warrant or court order.
(1) If we don't have a warrant or court order, you may deny us entry.
(2) If we have a warrant or court order, you must allow us to enter the facility and carry out the activities it describes.
(c) We may seek a warrant or court order authorizing an inspection described in this section, whether or not we first tried to get your permission to inspect.
(d) We may select any facility to do any of the following:
(1) Inspect and monitor any aspect of engine manufacturing, assembly, storage, or other procedures, and any facilities where you do them.
(2) Inspect and monitor any aspect of engine test procedures or test-related activities, including test engine selection, preparation, service accumulation, emission duty cycles, and maintenance and verification of your test equipment's calibration.
(3) Inspect and copy records or documents related to assembling, storing, selecting, and testing an engine.
(4) Inspect and photograph any part or aspect of engines and components you use for assembly.
(e) You must give us reasonable help without charge during an inspection. For example, you may need to help us arrange an inspection with the facility's managers, including clerical support, copying, and translation. You may also need to show us how the facility operates and answer other questions. If we ask in writing to see a particular employee at the inspection, you must ensure that he or she is present (legal counsel may accompany the employee).
(f) If you have facilities in other countries, we expect you to locate them in places where local law does not keep us from inspecting as described in this section. We will not try to inspect if we learn that local law prohibits it, but we may suspend your certificate if we are not allowed to inspect.

§1068.025 What definitions apply to this part?
Aircraft means any vehicle capable of sustained air travel above treetop heights.
Certificate holder means an engine manufacturer (including importers) with a valid certificate of conformity for at least one engine family in a given calendar year.
Designated Officer means the Manager of the Engine Programs Group (6403-J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., Washington, DC 20460.
Engine means an engine to which this part applies. For equipment subject to this part and regulated under equipment-based standards, the term engine in this part shall be interpreted to include equipment.
Engine-based means having emission standards related to measurements using an engine dynamometer, in units of grams of pollutant per kilowatt-hour.
Engine manufacturer has the meaning given in section 216(1) of the Act. In general, this term includes any person who manufactures an engine for sale in the United States or otherwise introduces a new engine into commerce in the United States. This includes importers. For equipment subject to this part and regulated under equipment-based standards, the term engine manufacturer in this part shall be interpreted to include equipment manufacturers.

Equipment-based means having emission standards related to measurements from an engine installed in a vehicle using a chassis dynamometer, in units of grams of pollutant per kilometer.

Equipment manufacturer means any company producing a piece of equipment for sale or use in the United States.

New has the meaning we give it in the standard-setting part.

Nonroad engine means:

(1) Except as discussed in paragraph (2) of this definition, a nonroad engine is any internal combustion engine:

(i) in or on a piece of equipment that is self-propelled or serves a dual purpose by both propelling itself and performing another function (such as garden tractors, off-highway mobile cranes and bulldozers); or

(ii) in or on a piece of equipment that is intended to be propelled while performing its function (such as lawnmowers and string trimmers); or

(iii) that, by itself or in or on a piece of equipment, is portable or transportable, meaning designed to be and capable of being carried or moved from one location to another. Indicia of transportability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform.

(2) An internal combustion engine is not a nonroad engine if:

(i) the engine is used to propel a motor vehicle or a vehicle used solely for competition, or is subject to standards promulgated under section 202 of the Act; or

(ii) the engine is regulated by a federal New Source Performance Standard promulgated under section 111 of the Act; or

(iii) the engine otherwise included in paragraph (1)(iii) of this definition remains or will remain at a location for more than 12 consecutive months or a shorter period of time for an engine located at a seasonal source. A location is any single site at a building, structure, facility, or installation. Any engine (or engines) that replaces an engine at a location and that is intended to perform the same or similar function as the engine replaced will be included in calculating the consecutive time period. An engine located at a seasonal source is an engine that remains at a seasonal source during the full annual operating period of the seasonal source. A seasonal source is a stationary source that remains in a single location on a permanent basis (i.e., at least two years) and that operates at that single location approximately three months (or more) each year. This paragraph does not apply to an engine after the engine is removed from the location.

Operating hours means:

(1) For engine storage areas or facilities, times during which people other than custodians are at work near, and can access, a storage area or facility.

(2) For other areas or facilities, times during which an assembly line operates or any of the following activities occurs:

(i) Testing, maintenance, or service accumulation.

(ii) Production or compilation of records.

(iii) Certification testing.

(iv) Translation of designs from the test stage to the production stage.

(v) Engine manufacture or assembly.

Piece of equipment means any vehicle, vessel, locomotive, aircraft, or other type of equipment using engines to which this part applies.

Placed into service means used for its intended purpose.

Standard-setting part means the part in the Code of Federal Regulations that defines emission standards for a particular engine (see §1068.001(a)).

Ultimate purchaser means the first person who in good faith buys a new engine without intending to resell it.

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands.

We (us, our) means the Administrator of the Environmental Protection Agency and any authorized representatives.

Subpart B—Prohibited Acts and Related Requirements

§1068.101 What general actions does this regulation prohibit?

(a) The following prohibitions apply to manufacturers of new engines and manufacturers of equipment containing these engines, except as described in subparts C and D of this part:

(1) You may not sell, offer for sale, or introduce or deliver into commerce in the United States or import into the United States any new engine or equipment after emission standards take effect for that engine or equipment, unless it has a valid certificate of conformity for its model year and the required label or tag. You also may not take any of the actions listed in the previous sentence with respect to any equipment containing an engine subject to this part's provisions, unless the engine has a valid certificate of conformity for its model year and the required engine label or tag. This requirement also covers new engines you produce to replace an older engine in a piece of equipment, unless the engine qualifies for the replacement-engine exemption in §1068.235. The maximum civil penalty is $27,500 for each engine in violation.

(2) This chapter requires you to record certain types of information to show that you meet our standards. You may not omit these requirements to make and maintain required records (including those described in §1068.501). You may not deny us access to or copying of your records if we have the authority to see or copy them. Also, you may not delay or omit giving us required reports or information. The maximum civil penalty is $27,500 for each day in violation.

(3) You may not keep us from entering your facility to test engines or inspect if we are authorized to do so. Also, you may not omit tests we require (or omit having the tests done for you). The maximum civil penalty is $27,500 for each day in violation.

(b) The following prohibitions apply to everyone with respect to the engines to which this part applies:

(1) You may not remove or disable a device or element of design that may affect an engine's emission levels. This restriction applies before and after the engine is placed in service. Section 1068.120 describes how this applies to rebuilding engines. For a manufacturer or dealer, the maximum civil penalty is $27,500 for each engine in violation. For anyone else, the maximum civil penalty is $2,500 for each engine in violation. This does not apply in any of the following situations:

(i) You need to repair an engine and you restore it to proper functioning when the repair is complete.

(ii) You need to modify an engine to respond to a temporary emergency and you restore it to proper functioning as soon as possible.

(iii) You modify a new engine that another manufacturer has already certified to meet emission standards, intending to recertify it under your own engine family. In this case you must tell the original manufacturer not to include the modified engines in the original engine family.

(2) You may not knowingly manufacture, sell, offer to sell, or install, an engine part if one of its main effects is to bypass, impair, defeat, or disable the engine's control of emissions. The maximum civil penalty is $2,500 for each part in violation.

(3) For an engine that is excluded from any requirements of this chapter because it is a stationary engine, you may not move it or install it in any mobile equipment, except as allowed by the provisions of this chapter. You may not circumvent or attempt to circumvent the residence-time requirements of paragraph (2)(iii) of the nonroad engine definition in §1068.025. The maximum civil penalty is $27,500 for each day in violation.

(4) For an engine or piece of equipment that is excluded from any requirements of this chapter because it is to be used solely for competition, you may not use it in a manner that is inconsistent with use solely for competition. The maximum civil penalty is $27,500 for each day in violation.

(c) Exemptions from these prohibitions are described in subparts C and D of this part.

(d) The standard-setting parts describe more requirements and prohibitions that apply to engine manufacturers (including importers) and others under this chapter.

(e) The maximum penalties in paragraphs (a) and (b) of this section and in §1068.125(b) are in 1970 dollars. The Federal Civil Penalties Inflation Adjustment Act of 1990 (Pub. L. 10-410) and associated regulations describe how to adjust these figures based on the date of the violation.

§1068.105 What other provisions apply to me specifically if I manufacture equipment needing certified engines?

(a) Transitioning to new standards. You may use up your normal inventory of engines not certified to new emission standards if they were built before the date of the new standards. However, stockpiling these engines violates §1068.101(a)(1).

(b) Installing engines. You must follow the engine manufacturer's emission-related installation instructions. For example, you may need to constrain where you place an exhaust aftertreatment device or integrate into your equipment models a device for sending visual or audible signals to the operator. Not meeting the manufacturer's emission-related installation instructions is a violation of §1068.101(b)(1).

(c) Attaching a duplicate label. If you obscure the engine's label, you must do three things to avoid violating §1068.101(a)(1):

(1) Permanently attach to your equipment a duplicate label. Secure it to a part needed for normal operation and not normally requiring replacement.

(2) Make sure your label is identical to the engine label. You may make the label yourself or get it from the engine manufacturer.

(3) Make sure an average person can easily read it.

(d) Producing nonroad equipment certified to highway emission standards. You may produce nonroad equipment from complete or incomplete motor vehicles with the motor vehicle engine if you meet three criteria:

(1) The engine or vehicle is certified to 40 CFR part 86.

(2) The engine is not adjusted outside the manufacturer's specifications.

(3) The engine or vehicle is not modified in any way that may affect its emission control. This applies to evaporative emission controls, but not refueling emission controls.

§1068.110 What other provisions apply to engines in service?

(a) Aftermarket parts and service. As the engine manufacturer, you may not require anyone to use your parts or service to maintain or repair an engine, unless we approve this in your application for certification.

(b) Certifying aftermarket parts. As the manufacturer or rebuilder of an aftermarket engine part, you may—but are not required to—certify according to §85.2114 of this chapter that using the part won't cause engines to fail to meet emission standards.

(c) Defeat devices. We may test equipment or engines to investigate potential defeat devices. We may also require the engine manufacturer to do this testing. If we choose to investigate one of your designs, we may require you to show us that it does not have a defeat device. To do this, you may have to share with us information regarding test programs, engineering evaluations, design specifications, calibrations, on-board computer algorithms, and design strategies.

(d) Warranty and maintenance. Owners may make warranty claims against the engine manufacturer for emission-related parts, as described in §1068.115. This generally includes any emission-related engine parts that were not in common use before we have adopted emission standards. In general, we consider replacement or repair of any other components to be the owner's responsibility. The warranty period begins when the engine is first placed into service.

§1068.115 When must engine manufacturers honor emission-related warranty claims?

(a) As an engine manufacturer, you may not deny emission-related warranty claims based on any of the following:

(1) Maintenance or other service you or your authorized facilities performed.

(2) Engine repair work that an operator performed to correct an unsafe, emergency condition attributable to you, as long as the operator tries to restore the engine to its proper configuration as soon as possible.

(3) Any action or inaction by the operator unrelated to the warranty claim.

(4) Maintenance that was performed more frequently than you specify.

(5) Anything that is your fault or responsibility.

(6) The use of any fuel that is commonly available where the engine operates, unless your written maintenance instructions state that this fuel would harm the engine's emission control system and operators can readily find the proper fuel.

(b) As long as none of the restrictions of paragraph (a) of this section apply, you may deny an emission-related

warranty claim if either of the following occurs:

(1) Owners are not able to show they followed your written maintenance instructions, as described in paragraph (c) of this section.

(2) You prove that the warranty claim was caused by any of the following:

(i) The operator abused the engine by using it for purposes for which it was not designed.

(ii) Someone improperly installed an engine part or set engine parameters outside your specified adjustable ranges during any scheduled maintenance related to the affected part or system.

(iii) Someone permanently removed or disabled the engine's emission control system or any of its components during unscheduled maintenance related to the affected part or system.

(c) You may ask owners to show they followed your written maintenance instructions only if you have an objective reason to believe they did not follow these instructions and that this would have caused the defect that is the subject of their warranty claim.

(1) If owners do their own maintenance, they may state that they performed the prescribed maintenance at the approximate intervals (in months or operating hours) and show they bought and used proper parts. You may ask them to show they are able to perform the maintenance properly.

(2) If owners hire others to maintain their engines, they may rely on a service receipts or a maintenance log book validated at the approximate intervals (in months or operating hours) by those who performed the maintenance.

§1068.120 What requirements must I follow to rebuild engines?

(a) This section describes the steps to take when rebuilding engines to avoid violating the tampering prohibition in §1068.101(b)(1). These requirements apply to anyone rebuilding an engine subject to this part, but the reporting requirements in paragraphs (i) and (j) apply only to businesses.

(b) The term "rebuilding" refers to a partial or complete rebuild of an engine or engine system, including a major overhaul in which you replace the engine's power assemblies or make other changes that significantly increase the service life of the engine. It also includes replacing or rebuilding an engine's turbocharger or aftercooler or its systems for fuel metering or electronic control. For these provisions, rebuilding may or may not involve removing the engine from the equipment. For other maintenance or service that isn't rebuilding, you must still not make changes that might increase emissions, but you don't need to keep any records.

(c) If you rebuild an engine, you must have a reasonable technical basis for knowing that the rebuilt engine has the same emissions performance as the engine in its certified configuration. Identify the model year of the resulting engine configuration. You have a reasonable basis if you meet two main conditions:

(1) Install parts— new, used, or rebuilt— so a person familiar with engine design and function would reasonably believe that the engine with those parts will control emissions to the same degree as with the original parts.

(2) Adjust parameters or change design elements only according to the original engine manufacturer's instructions. Or, if you differ from these instructions, you must have data or some other technical basis to show you should not expect in-use emissions to increase.

(d) If the rebuilt engine remains installed or is reinstalled in the same piece of equipment, you must rebuild it to the original configuration or another certified configuration of the same or later model year.

(e) If the rebuilt engine replaces another engine in a piece of equipment, you must rebuild it to a certified configuration that equals the emissions performance of the engine you are replacing.

(f) Don't erase or reset emission-related codes or signals from onboard monitoring systems without diagnosing and responding appropriately to any diagnostic codes. This requirement applies regardless of the manufacturer's reason for installing the monitoring system and regardless of its form or interface. Clear any codes from diagnostic systems when you return the rebuilt engine to service. Don't disable a diagnostic signal without addressing its cause.

(g) When you rebuild an engine, check, clean, adjust, repair, or replace all emission-related components (listed in Appendix I of this part) as needed according to the original manufacturer's recommended practice.
In particular, replace oxygen sensors, replace the catalyst if there is evidence of malfunction, clean gaseous fuel system components, and replace fuel injectors (if applicable).

(h) If you are installing an engine that someone else has rebuilt, check all emission-related components listed in Appendix I of this part as needed according to the original manufacturer's recommended practice.

(i) Keep at least the following records:

(1) Identify the hours of operation (or mileage, as appropriate) at time of rebuild.

(2) Identify the work done on the engine or any emission-related control components, including a listing of parts and components you used.

(3) Describe any engine parameter adjustments.

(4) Identify any emission-related codes or signals you responded to and reset.

(j) You must show us or send us your records if we ask for them. Keep records for at least two years after rebuilding an engine. Keep them in any format that allows us to readily review them.

(1) You don't need to keep information that isn't reasonably available through normal business practices. We don't expect you to have information that you can't reasonably access.

(2) You don't need to keep records of what other companies do.

(3) You may keep records based on engine families rather than individual engines if that is the way you normally do business.

§1068.125 What happens if I violate the regulations?

(a) Civil penalties and injunctions. We may bring a civil action to assess and recover civil penalties and/or enjoin and restrain violations in the United States District Court for the district where you allegedly violated a requirement, or the district where you live or have your main place of business. Actions to assess civil penalties or restrain violations of §1068.101 must be brought by and in the name of the United States. The selected court has jurisdiction to restrain violations and assess civil penalties.

(1) To determine the amount of a civil penalty and reach a just conclusion, the court considers six main factors:

(i) The seriousness of your violation.

(ii) How much you benefitted or saved because of the violation.

(iii) The size of your business.

(iv) Your history of compliance with Title II of the Act.

(v) What you did to remedy the violation.

(vi) How the penalty will affect your ability to continue in business.

(2) Subpoenas for witnesses who must attend a district court in any district may apply to any other district.

(b) Administrative penalties. Instead of bringing a civil action, we may assess administrative penalties if the total is less than $200,000 against you individually. This maximum penalty may be greater if the Administrator and the Attorney General jointly determine that is appropriate for administrative penalty assessment. No court may review such a determination. Before we assess an administrative penalty, you may ask for a hearing (subject to 40 CFR part 22).

(1) To determine the amount of an administrative penalty, we will consider the factors described in paragraph (a)(1) of this section.

(2) An administrative order we issue under this paragraph becomes final 30 days after we issue it, unless you ask for judicial review by that time (see paragraph (c) of this section). You may ask for review by any of the district courts listed in paragraph (a) of this section. Send the Administrator a copy of the filing by certified mail.

(3) We will not pursue an administrative action for a violation if either of the following two conditions is true:

(i) We are separately prosecuting the violation under this part.

(ii) We have issued a final order for a violation, no longer subject to judicial review, for which you have already paid a penalty.

(c) Judicial review. If you ask a court to review a civil or administrative penalty, we will file in the appropriate court within 30 days of your request a certified copy or certified index of the record on which the court or the Administrator issued the order.

(1) The judge may set aside or remand any order issued under this section only if he or she believes one of the following is true:

(i) Substantial evidence does not exist in the record, taken as a whole, to support finding a violation.

(ii) The Administrator's assessment of the penalty is an abuse of discretion.

(2) The judge may add civil penalties if he or she believes our penalty is an abuse of discretion that favors you.

(d) Effect of enforcement actions on other requirements. Our pursuit of civil or administrative penalties does not

affect or limit our authority to enforce any provisions of this chapter.

(e) Penalties. In any proceedings, the United States government may seek to collect civil penalties assessed under this section.

(1) Once a penalty assessment is final, if you don't pay it, the Administrator will ask the Attorney General to bring a civil action in an appropriate district court to recover the money. We may collect interest from the date of the final order or final judgment at rates established by section 6621(a)(2) of the Internal Revenue Code of 1986. In this action to collect overdue penalties, the court will not review the validity, amount, and appropriateness of the penalty.

(2) In addition, if you don't pay the full amount of a penalty on time, you must then pay more to cover interest, enforcement expenses (including attorney's fees and costs for collection), and a quarterly nonpayment penalty for each quarter you don't pay. The nonpayment penalty is 10 percent of your total penalties plus any unpaid nonpayment penalties from previous quarters.

Subpart C—Exemptions

§1068.201 Does EPA exempt any engines from the prohibited acts?

We may exempt new engines from the prohibited acts in subpart B of this part under requirements described in this subpart. We may exempt an engine already placed in service in the United States from the prohibition in §1068.101(b)(1) if the exemption for engines used solely for competition applies (see §1068.230).

(a) The following sections identify which engines qualify for exemptions and what information we need. We may ask for more information.

(b) If you violate any of the terms, conditions, instructions, or requirements to qualify for an exemption, we may void the exemption.

(c) If you use an exemption under this subpart, we may require you to add a permanent label to your exempted engines.

(d) If you produce engines we exempt under this subpart, we may require you to make and keep records, perform tests, make reports and provide information as needed to reasonably evaluate the validity of the exemption.

(e) If you own or operate engines we exempt under this subpart, we may require you to provide information as needed to reasonably evaluate the validity of the exemption.

(f) Subpart D of this part describes how we apply these exemptions to engines you import (or intend to import).

(g) If you want to ask for an exemption or need more information, write to the Designated Officer.

§1068.205 What are the provisions for exempting test engines?

(a) We may exempt engines you use for research, investigations, studies, demonstrations, or training.

(b) Anyone may ask for a testing exemption.

(c) If you are a certificate holder, you may request an exemption for engines you intend to include in test programs over a two-year period.

(1) In your request, tell us the maximum number of engines involved and describe how you will make sure exempted engines are used only for this testing.

(2) Give us the information described in paragraph (d) of this section if we ask for it.

(d) If you are not a certificate holder do all of the following:

(1) Show that the proposed test program has a valid purpose under paragraph (a) of this section.

(2) Show you need an exemption to achieve the purpose of the test program (time constraints may be a basis for needing an exemption, but the cost of certification alone is not).

(3) Estimate the duration of the proposed test program and the number of engines involved.

(4) Allow us to monitor the testing.

(5) Describe how you will ensure that you stay within this exemption's purposes. Address at least the following things:

(i) The technical nature of the test.

(ii) The test site.

(iii) The duration and accumulated engine operation associated with the test.

(iv) Ownership of the engines involved in the test.

(v) The intended final disposition of the engines.

(vi) How you will identify, record, and make available the engine identification numbers.

(vii) The means or procedure for recording test results.

(e) If we approve your request for a testing exemption, we will send you a letter or a memorandum for your signature describing the basis and scope of the exemption. It will also include any necessary terms and conditions, which normally require you to do the following:

(1) Stay within the scope of the exemption.

(2) Create and maintain adequate records that we may inspect.

(3) Add a permanent, legible label, written in block letters in English, to a readily visible part of each exempted engine. This label must include at least the following items:

(i) The label heading "EMISSION CONTROL INFORMATION."

(ii) Your corporate name and trademark.

(iii) Engine displacement, engine family identification, and model year of the engine or whom to contact for further information.

(iv) The statement "THIS ENGINE IS EXEMPT UNDER §1068.205 FROM EMISSION STANDARDS AND RELATED REQUIREMENTS."

(4) Tell us when the test program is finished.

(5) Tell us the final disposition of the engines.

(6) Send us a written confirmation that you meet the terms and conditions of this exemption.

§1068.210 What are the provisions for exempting manufacturer-owned engines?

(a) You are only eligible for this exemption if you are a certificate holder.

(b) An engine may be exempt without a request if it is a nonconforming engine under your ownership and control and you operate it to develop products, assess production methods, or promote your engines in the marketplace. You may not lease, sell, or use the engine to generate revenue, either by itself or in a piece of equipment.

(c) To use this exemption, you must do three things:

(1) Establish, maintain, and keep adequately organized and indexed information on each exempted engine, including the engine identification number, the use of the engine on exempt status, and the final disposition of any engine removed from exempt status.

(2) Let us access these records, as described in §1068.020.

(3) Add a permanent, legible label, written in block letters in English, to a readily visible part of each exempted engine. This label must include at least the following items:

(i) The label heading "EMISSION CONTROL INFORMATION."

(ii) Your corporate name and trademark.

(iii) Engine displacement, engine family identification, and model year of the engine or whom to contact for further information.

(iv) The statement "THIS ENGINE IS EXEMPT UNDER §1068.210 FROM EMISSION STANDARDS AND RELATED REQUIREMENTS."

§1068.215 What are the provisions for exempting display engines?

(a) You are only eligible for this exemption if you are a certificate holder.

(b) A display engine is exempt without a request if it is a nonconforming engine you use only for displays in the interest of a business or the general public. This exemption does not apply to engines displayed for any of the following:

(1) For private use.

(2) For other purposes that are not available to the public daily.

(3) For any other purpose we determine is inappropriate for a display exemption.

(c) You may operate the exempted engine, but only if the operation is part of the display. You may not sell or lease a display engine or use it to generate revenue without a certificate of conformity and an engine label.

(d) To use this exemption, you must add a permanent, legible label, written in block letters in English, to a readily visible part of each exempted engine. This label must include at least the following items:

(i) The label heading "EMISSION CONTROL INFORMATION."

(ii) Your corporate name and trademark.

(iii) Engine displacement, engine family identification, and model year of the engine or whom to contact for further information.

(iv) The statement "THIS ENGINE IS EXEMPT UNDER §1068.215 FROM EMISSION STANDARDS AND RELATED REQUIREMENTS."

§1068.220 What are the provisions for exempting engines for national security?

(a) You are only eligible for this exemption if you are an engine manufacturer.

(b) Your engine is exempt without a request if you produce it for a piece of equipment owned or used by an agency of the federal government responsible for national defense, where the equipment has armor, permanently attached weaponry, or other substantial features typical of military combat.

(c) You may request a national security exemption for engines not meeting the conditions of paragraph (b) of this

section, as long as your request is endorsed by an agency of the federal government responsible for national defense. In your request, explain why you need the exemption.

§1068.225 What are the provisions for exempting engines for export?

(a) If you export a new engine to a country with emission standards identical to ours, we will not exempt it. These engines must comply with our certification requirements.

(b) If you export an engine to a country with different emission standards or no emission standards, it is exempt from the prohibited acts in this part without a request. If you produce an exempt engine for export and it is sold or offered for sale to someone in the United States (except for export), we will void the exemption.

(c) Label each exempted engine and shipping container with a label or tag showing the engine is not certified for sale or use in the United States. The label must include at least the statement "THIS ENGINE IS SOLELY FOR EXPORT AND IS THEREFORE IS EXEMPT UNDER §1068.225 FROM U.S. EMISSION STANDARDS AND RELATED REQUIREMENTS."

§1068.230 What are the provisions for exempting engines used solely for competition?

(a) If you modify an engine after it has been placed into service in the United States so it will be used solely for competition, it is exempt without request. This exemption applies only to the prohibition in §1068.101(b)(1) and is valid only as long as the engine is used solely for competition.

(b) If you modify an engine under this exemption, you must destroy the original emissions label. If you sell or give one of these engines to someone else, you must tell the new owner in writing that it may be used only for competition.

(c) New engines you produce that are used solely for competition are generally excluded from emission standards. See the standard-setting parts for specific provisions.

§1068.235 What are the provisions for exempting new replacement engines?

(a) You are only eligible for this exemption if you are a certificate holder.

(b) The prohibitions in §1068.101(a)(1) do not apply to an engine if all the following conditions apply:

(1) You produce a new engine to replace an engine already placed in service in a piece of equipment.

(2) The engine being replaced was manufactured before the emission standards that would otherwise apply to the new engine took effect.

(3) No engine certified to current emission requirements is available with the appropriate physical or performance characteristics for the piece of equipment.

(4) You or your agent takes possession of the old engine.

(5) You clearly label the replacement engine with the following language, or similar alternate language that we approve: THIS ENGINE DOES NOT COMPLY WITH FEDERAL NONROAD OR HIGHWAY EMISSION REQUIREMENTS. SELLING OR INSTALLING THIS ENGINE FOR ANY PURPOSE OTHER THAN AS A REPLACEMENT ENGINE IN A VEHICLE OR PIECE OF EQUIPMENT BUILT BEFORE JANUARY 1, [INSERT APPROPRIATE YEAR] IS A VIOLATION OF FEDERAL LAW SUBJECT TO CIVIL PENALTY.

(6) You make the replacement engine in a configuration identical in all material respects to the engine being replaced (or that of another certified engine of the same or later model year). This requirement applies only if the old engine was certified to emission standards less stringent than those in effect when you produce the replacement engine.

§1068.240 What temporary provisions address hardship due to unusual circumstances?

(a) After considering the circumstances, we may permit you to introduce into commerce engines or equipment that do not comply with emission standards if all the following conditions and requirements apply:

(1) Unusual circumstances that are clearly outside your control and that could not have been avoided with reasonable discretion prevent you from meeting requirements from this chapter.

(2) You exercised prudent planning and were not able to avoid the violation; you have taken all reasonable steps to minimize the extent of the nonconformity.

(3) Not having the exemption will jeopardize the solvency of your company.

(4) No other allowances are available under the regulations to avoid the impending violation.

(b) To apply for an exemption, you must send the Designated Officer a written request as soon as possible before you are in violation. In your request, show that you meet all the conditions and requirements in paragraph (a) of this section.

(c) Include in your request a plan showing how you will meet all the applicable requirements as quickly as possible.

(d) You must give us other relevant information if we ask for it.

(e) We may include reasonable additional conditions on an approval granted under this section, including provisions to recover or otherwise address the lost environmental benefit or paying fees to offset any economic gain resulting from the exemption. For example, in the case of multiple tiers of emission standards, we may require that you meet the less stringent standards.

§1068.241 What are the provisions for extending compliance deadlines for small-volume manufacturers under hardship?

(a) After considering the circumstances, we may extend the compliance deadline for you to meet new or revised emission standards, as long as you meet all the conditions and requirements in this section.

(b) To be eligible for this exemption, you must qualify under the standard-setting part for special provisions for small businesses or small-volume manufacturers.

(c) To apply for an extension, you must send the Designated Officer a written request. In your request, show that all the following conditions and requirements apply:

(1) You have taken all possible business, technical, and economic steps to comply.

(i) In the case of importers, show that you are unable to find a manufacturer capable of supplying complying products.

(ii) For all other manufacturers, show that the burden of compliance costs prevents you from meeting the requirements of this chapter.

(2) Not having the exemption will jeopardize the solvency of your company.

(3) No other allowances are available under the regulations to avoid the impending violation.

(d) In describing the steps you have taken to comply under paragraph (c)(1) of this section, include at least the following information:

(1) Describe your business plan, showing the range of projects active or under consideration.

(2) Describe your current and projected financial standing, with and without the burden of complying with regulations.

(3) Describe your efforts to raise capital to comply with regulations.

(4) Identify the engineering and technical steps you have taken or plan to take to comply with regulations.

(5) Identify the level of compliance you can achieve. For example, you may be able to produce engines that meet a somewhat less stringent emission standard than the regulations require.

(e) Include in your request a plan showing how you will meet all the applicable requirements as quickly as possible.

(f) You must give us other relevant information if we ask for it.

(g) An authorized representative of your company must sign the request and include the statement: "All the information in this request is true and accurate, to the best of my knowledge."

(h) Send your request for this extension at least nine months before the relevant deadline. If different deadlines apply to companies that are not small-volume manufacturers, do not send your request before the regulations in question apply to the other manufacturers. Otherwise, do not send your request more than three years before the relevant deadline.

(i) We may include reasonable requirements on an approval granted under this section, including provisions to recover or otherwise address the lost environmental benefit. For example, we may require that you meet a less stringent emission standard or buy and use available emission credits.

(j) We will approve extensions of up to one year. We may review and revise an extension as reasonable under the circumstances.

§1068.245 What are the provisions for exempting engines for hardship for equipment manufacturers?

(a) Equipment exemption. As an equipment manufacturer in the case of an engine-based standard, you may ask for approval to produce exempted equipment for up to one year. Send the Designated Officer a written request for an exemption before you are in violation. In your request, show you are not at fault for the impending violation and that you would face serious economic hardship if we don't grant the exemption. This exemption is not available if you manufacture the engine you need for your own equipment, unless we allow it elsewhere in this chapter. We may impose other conditions, including provisions to recover the lost environmental benefit.

(b) Engine exemption. As an engine manufacturer, you may produce nonconforming engines for the equipment we exempt in paragraph (a) of this section. You don't have to request this exemption for your engines, but you must have written assurance from equipment manufacturers that they need a certain number of exempted engines under this section. Add a permanent, legible label, written in block letters in English, to a readily visible part of each exempted engine. This label must include at least the following items:

(1) The label heading "EMISSION CONTROL INFORMATION."

(2) Your corporate name and trademark.

(3) Engine displacement (in liters), rated power, and model year of the engine or whom to contact for further information.

(4) The statement "THIS ENGINE IS EXEMPT UNDER §1068.245 FROM EMISSION STANDARDS AND RELATED REQUIREMENTS."

Subpart D—Imports

§1068.301 Does this subpart apply to me?

(a) This subpart applies to you if you import into the United States engines or equipment subject to our emission standards or equipment containing engines subject to our emission standards.

(b) In general, engines that you import must be covered by a certificate of conformity unless they were built before emission standards started to apply. This subpart describes the limited cases where we allow importation of exempt or excluded engines.

(c) The U.S. Customs Service may prevent you from importing an engine if you don't meet the requirements of this subpart. In addition, U.S. Customs Service regulations may contain other requirements for engines imported into the United States (see 19 CFR Chapter I).

§1068.305 How do I get an exemption or exclusion for imported engines?

(a) Prepare a written request in which you do the following:

(1) Give your name, address, telephone number, and taxpayer identification number.

(2) Give the engine owner's name, address, telephone number, and taxpayer identification number.

(3) Identify the make, model, identification number, and original production year of each engine.

(4) Identify which exemption or exclusion in this subpart allows you to import a nonconforming engine and describe how your engine qualifies.

(5) Tell us where you will keep your engines if you might need to store them until we approve your request.

(6) Authorize us to inspect or test your engines as the Act allows.

(b) We may ask for more information.

(c) You may import the nonconforming engines you identify in your request if you get prior written approval from us. The U.S. Customs Service may require you to show them the approval letter. We may temporarily or permanently approve the exemptions or exclusions, as described in this subpart.

(d) Make sure the engine meets any labeling requirements that apply, as described in this subpart..

§1068.310 What are the exclusions for imported engines?

The emission standards of this part do not apply to excluded engines. If you show us that your engines qualify under one of the following provisions, we will approve your request to exclude engines:

(a) Engines used solely for competition. See the standard-setting part for any special provisions that apply to engines used solely for competition. Paragraph 1068.101(b)(4) prohibits using these engines for other purposes.

(b) Stationary engines. This includes engines that will be used in a permanently fixed location and engines meeting the criteria for the exclusion in paragraph (2)(iii) of the nonroad engine definition in §1068.025. Paragraph §1068.101(b)(3) prohibits using these engines for other purposes.

(c) Hobby engines. See 40 CFR 90.1.

(d) Engines used in aircraft. See 40 CFR part 87.

(e) Engines used in underground mining. See 40 CFR 89.1.

§1068.315 What are the permanent exemptions for imported engines?

We may approve a permanent exemption for an engine under the following conditions:

(a) National security exemption. You may an import engine under the national security exemption in §1068.220.

(b) Manufacturer-owned engine exemption. You may import a manufacturer-owned engine, as described in §1068.210.

(c) Replacement engine exemption. You may import a nonconforming replacement engine as described in §1068.235. To use this exemption, you must be a certificate holder for an engine family we regulate under the same part as the replacement engine.

(d) Extraordinary circumstances exemption. You may import a nonconforming engine if we grant hardship relief as described in 1068.240.

(e) Hardship exemption. You may import a nonconforming engine if we grant an exemption for the transition to new or revised emission standards, as described in §1068.245.

(f) Identical configuration exemption. You may import a nonconforming engine if it is identical to certified engines, subject to the following provisions:

(1) You may import only the following engines under this exemption:

(i) Large nonroad spark-ignition engines (see part 1048 of this chapter).

(ii) Recreational nonroad spark-ignition engines and equipment (see part 1051 of this chapter).

(2) You must meet all the following criteria:

(i) You have owned the engine for at least one year.

(ii) You agree not to sell, lease, donate, trade, or otherwise transfer ownership of the engine for at least five years, or until the engine is eligible for the exemption in paragraph (h) of this section. The only acceptable way to dispose of the engine is to destroy or export it.

(iii) You use data or evidence sufficient to show that the engine is in a configuration that is the same as an engine the original manufacturer has certified to meet emission standards that apply at the time the manufacturer finished assembling or modifying the engine in question. If you modify the engine to make it identical, you must follow the original manufacturer's complete written instructions.

(3) We will tell you in writing if we find the information insufficient to show that the engine is eligible for this exemption. In this case, we will not consider your request further until you address our concerns.

(g) Personal-use exemption. You may import a nonconforming engine for your personal use.

(1) You may import only the number of engines shown in Table 1 of §1068.315 during your lifetime.

(2) You must meet both the following criteria:

(i) You have owned the engine for at least one year.

(ii) You agree not to sell, lease, donate, trade, or otherwise transfer ownership of the engine for at least five years, or until the engine is eligible for the exemption in paragraph (h) of this section. The only acceptable way to dispose of the engine is to destroy or export it.

(3) You don't need our approval, but you must send the Designated Officer a form in which you do the following:

(i) Identify the engine importer's name, address, telephone number, and taxpayer identification number.

(ii) Identify your name, address, telephone number, and taxpayer identification number.

(iii) State the number of each type of engine that you have ever imported under this exemption.

(iv) State that you agree not to sell or lease the engine in the United States.

(v) Identify the engine's make, model, and identification number as well as the year the manufacturer finished assembling the engine.

(vi) Authorize us to inspect as the Act and the regulations permit.

(4) Respond promptly if we ask for more information.

(h) Ancient engine exemption. If you are not the original engine manufacturer, you may import a nonconforming engine that was first manufactured at least 21 years earlier, as long as it's still in its original configuration.

Table 1 of §1068.315

Type of Engine or Equipment	Standard-Setting Part	Maximum Number of Engines
Large nonroad spark-ignition engines	1048	1
Recreational nonroad spark-ignition engines and equipment	1051	3

§1068.320 How must I label an imported engine with a permanent exemption?

(a) For engines imported under §1068.315 (a), (b), (c), (d), or (e), you must place a permanent label or tag on each engine. If no specific label requirements from subpart C of this part apply, you must meet the following requirements:

(1) Attach the label or tag in one piece so no one can remove it without destroying or defacing it.

(2) Make sure it is durable and readable for the engine's entire life.

(3) Secure it to a part of the engine needed for normal operation and not normally requiring replacement.
(4) Write it in block letters in English.
(5) Make it readily visible to the average person after the engine is installed in the equipment.

(b) On the engine label or tag, do the following:
(1) Include the heading "Emission Control Information."
(2) Include your full corporate name and trademark.
(3) State the engine displacement (in liters) and rated power.
(4) State: "THIS ENGINE IS EXEMPT FROM THE REQUIREMENTS OF [identify the part referenced in 1068.001(a) that would otherwise apply], AS PROVIDED IN [identify the paragraph authorizing the exemption (for example, "40 CFR 1068.315(a)")]. INSTALLING THIS ENGINE IN ANY DIFFERENT APPLICATION IS A VIOLATION OF FEDERAL LAW SUBJECT TO CIVIL PENALTY.

(c) Get us to approve alternate label language if it is more accurate for your engine.

§1068.325 What are the temporary exemptions for imported engines?

If we approve a temporary exemption for an engine, you may import it under the conditions in this section. We may ask the U.S. Customs Service to require a specific bond amount to make sure you comply with the requirements of this subpart. You may not sell or lease one of these engines while it is in the United States. You must eventually export the engine as we describe in this section unless you get a certificate of conformity for it or it qualifies for one of the permanent exemptions in §1068.315.

(a) Exemption for repairs or alterations. You may temporarily import a nonconforming engine under bond solely to repair or alter it. You may operate the engine in the United States only to repair or alter it or to ship it to or from the service location. Export the engine directly after the engine servicing is complete.

(b) Testing exemption. You may temporarily import a nonconforming engine under bond for testing if you follow the requirements of §1068.205. You may operate the engine in the United States only to allow testing. This exemption expires one year after you import the engine, unless we approve a one-time request for an extension of up to one more year. The engine must be exported before the exemption expires.

(c) Display exemption. You may temporarily import a nonconforming engine under bond for display, as described in §1068.215. This exemption expires one year after you import the engine, unless we approve your request for an extension. We may approve an extension of up to one more year for each request, but no more than three years in total. The engine must be exported by the time the exemption expires or directly after the display concludes, whichever comes first.

(d) Export exemption. You may temporarily import a nonconforming engine to export it, as described in §1068.225. You may operate the engine in the United States only as needed to prepare it for export. Label the engine as described in §1068.225.

(e) Diplomatic or military exemption. You may temporarily import nonconforming engines without bond if you represent a foreign government in a diplomatic or military capacity. In your request to the Designated Officer (see §1068.305), include either written confirmation from the U.S. State Department that you qualify for this exemption or a copy of your orders for military duty in the United States. We will rely on the State Department or your military orders to determine when your diplomatic or military status expires, at which time you must export your exempt engines.

§1068.330 What are the penalties for violations?

(a) All imported engines. Unless you comply with the provisions of this subpart, importation of nonconforming engines is violation of sections 203 and 213(d) of the Act. You may then have to export the engines, or pay civil penalties, or both. The U.S. Customs Service may seize unlawfully imported engines.

(b) Temporarily imported engines. If you don't comply with the provisions of this subpart for a temporary exemption, you may forfeit the total amount of the bond in addition to the sanctions we identify in paragraph (a) of this section. We will consider an engine to be exported if it has been destroyed or delivered to the U.S. Customs Service for export or other disposition under applicable Customs laws and regulations. EPA or the U.S. Customs Service may offer you a grace period to allow you to export a temporarily exempted engine without penalty after the exemption expires.

Subpart E—Selective Enforcement Auditing

§1068.401 What is a selective enforcement audit?

(a) We may conduct or require you to conduct emission tests on your production engines in a selective enforcement audit. This requirement is independent of any requirement for you to routinely test production-line engines.

(b) If we send you a signed test order, you must follow its directions and the provisions of this subpart. We will tell you where to test the engines. This may be where you produce the engines or any other emission testing facility.

(c) If we select one or more of your engine families for a selective enforcement audit, we will send the test order to the person who signed the application for certification or we will deliver it in person.

(d) Within one working day of receiving the test order, notify the Designated Officer which test facility you have selected for emission testing.

(e) You must do everything we require in the audit without delay.

§1068.405 What is in a test order?

(a) In the test order, we will specify the following things:

(1) The engine family and configuration (if any) we have identified for testing.

(2) The engine assembly plant, storage facility, or (if you import the engines) port facility from which you must select engines.

(3) The procedure for selecting engines for testing, including a selection rate.

(4) The test procedures, duty cycles, and test points, as appropriate, for testing the engines to show that they meet emission standards.

(b) We may state that we will select the test engines.

(c) We may identify alternate engine families or configurations for testing in case we determine the intended engines aren't available for testing or if you don't produce enough engines to meet the minimum rate for selecting test engines.

(d) We may include other directions or information in the test order.

(e) We may ask you to show us that you meet any additional requirements that apply to your engines (closed crankcases, for example).

(f) In anticipation of a potential audit, you may give us a list of your preferred engine families and the corresponding assembly plants, storage facilities, or (if you import the engines) port facilities from which we should select engines for testing. The information would only apply for a single model year, so it would be best to include this information in your application for certification. If you give us this list before we issue a test order, we will consider your recommendations, but we may select engines differently.

(g) If you also do routine production-line testing with the selected engine family in the same time period, the test order will tell you what changes you might need to make in your production-line testing schedule.

§1068.410 How must I select and prepare my engines?

(a) Selecting engines. Select engines as described in the test order. If you are unable to select test engines this way, you may ask us to approve an alternate plan, as long as you make the request before you start selecting engines.

(b) Assembling engines. Produce and assemble test engines using your normal production and assembly process for that engine family.

(1) Notify us directly if you make any change in your production, assembly, or quality control processes that might affect emissions between the time you receive the test order and the time you finish selecting test engines.

(2) If you don't fully assemble engines at the specified location, we will describe in the test order how to select components to finish assembling the engines. Assemble these components onto the test engines using your documented assembly and quality control procedures.

(c) Modifying engines. Once an engine is selected for testing, you may adjust, repair, prepare, or modify it or check its emissions only if one of the following is true:

(1) You document the need for doing so in your procedures for assembling and inspecting all your production engines and make the action routine for all the engines in the engine family.

(2) This subpart otherwise allows your action.
(3) We approve your action in advance.

(d) Engine malfunction. If an engine malfunction prevents further emission testing, ask us to approve your decision to either repair the engine or delete it from the test sequence.

(e) Setting adjustable parameters. Before any test, we may adjust or require you to adjust any adjustable parameter to any setting within its physically adjustable range.

(1) We may adjust idle speed outside the physically adjustable range as needed until the engine has stabilized emission levels (see paragraph (e) of this section). We may ask you for information needed to establish an alternate minimum idle speed.

(2) We may make or specify adjustments within the physically adjustable range by considering their effect on emission levels, as well as how likely it is someone will make such an adjustment with in-use engines.

(f) Stabilizing emission levels. Before you test production-line engines, you may operate the engine to stabilize the emission levels. Using good engineering judgment, operate your engines in a way that represents the way production engines will be used. You may operate each engine for no more than the greater of two periods:

(1) 50 hours.

(2) The number of hours you operated your emission-data engine for certifying the engine family (see 40 CFR part 1065, subpart E).

(g) Damage during shipment. If shipping an engine to a remote facility for production-line testing makes necessary an adjustment or repair, you must wait until after the after the initial emission test to do this work. We may waive this requirement if the test would be impossible or unsafe, or if it would permanently damage the engine. Report to us, in your written report under §1068.450, all adjustments or repairs you make on test engines before each test.

(h) Shipping engines. If you need to ship engines to another facility for testing, make sure the test engines arrive at the test facility within 24 hours after being selected. You may ask that we allow more time if you are unable to do this.

(i) Retesting after invalid tests. You may retest an engine if you determine an emission test is invalid. Explain in your written report reasons for invalidating any test and the emission results from all tests. If you retest an engine and, within ten days after testing, ask to substitute results of the new tests for the original ones, we will answer within ten days after we receive your information.

§1068.415 How do I test my engines?

(a) Use the test procedures in part 1065 of this chapter that apply to your engines to show they meet emission standards. The test order will give further testing instructions.

(b) If no test cells are available at a given facility, you may make alternate testing arrangements with our approval.

(c) Test at least two engines in each 24-hour period (including void tests). However, if your projected U.S. nonroad engine sales are less than 7,500 for the year, you may test a minimum of one engine per 24-hour period. If you request and justify it, we may approve a lower testing rate.

(d) Accumulate service on test engines at a minimum rate of 6 hours per engine during each 24-hour period. The first 24-hour period for service accumulation begins when you finish preparing an engine for testing. The minimum service accumulation rate does not apply on weekends or holidays. You may ask us to approve a lower service accumulation rate. Plan your service accumulation to allow testing at the rate specified in §1068.415. Select engine operation for accumulating operating hours on your test engines to represent normal in-use engine operation for the engine family.

(e) Test engines is the same order you select them.

§1068.420 How do I know when my engine family doesn't comply?

(a) A failed engine is one whose final deteriorated test results exceed an applicable emission standard for any regulated pollutant.

(b) Continue testing engines until you reach a pass decision for all pollutants or a fail decision for one pollutant.

(c) You reach a pass decision when the number of failed engines is less than or equal to the pass decision number in Appendix A to this subpart for the total number of engines tested. You reach a fail decision when the number of failed engines is greater than or equal to the fail decision number in Appendix A to this subpart for the total number of engines you test. An acceptable quality level of 40 percent is the basis for the pass or fail decision.

(d) Consider test results in the same order as the engine testing sequence.
(e) If you reach a pass decision for one pollutant, but need to continue testing for another pollutant, we will disregard these later test results for the pollutant with the pass decision.
(f) Appendix A to this subpart lists multiple sampling plans. Use the sampling plan for the projected sales volume you reported in your application for the audited engine family.
(g) We may choose to stop testing after any number of tests.
(h) If we test some of your engines in addition to your own testing, we may decide not to include your test results as official data for those engines if there is substantial disagreement between your testing and our testing. We will reinstate your data as valid if you show us that we made an error and your data are correct.
(i) If we rely on our test data instead of yours, we will notify you in writing of our decision and the reasons we believe your facility is not appropriate for doing the tests we require under this subpart. You may request in writing that we consider your test results from the same facility for future testing if you show us that you have made changes to resolve the problem.

§1068.425 What happens if one of my production-line engines exceeds the emission standards?
(a) If an engine fails to meet one or more emission standards (see §1068.420), the certificate of conformity is automatically suspended for that engine. You must take the following actions before your certificate of conformity can cover that engine:
(1) Correct the problem and retest the engine to show it complies with all emission standards.
(2) Include in your written report a description of the test results and the remedy for each engine (see §1068.450).
(b) You may at any time ask for a hearing to determine whether the tests and sampling methods were proper (see §1068.601).

§1068.430 What happens if an engine family doesn't comply?
(a) We may suspend your certificate of conformity for an engine family if it fails to comply under §1068.420. The suspension may apply to all facilities producing engines from an engine family, even if you find noncompliant engines only at one facility.
(b) We will tell you in writing if we suspend your certificate in whole or in part. We won't suspend a certificate until at least 15 days after the engine family became noncompliant. The suspension is effective when you receive our notice.
(c) Up to 15 days after we suspend the certificate for an engine family, you may ask for a hearing to determine whether the tests and sampling methods were proper (see §1068.601). If we agree before a hearing that we used erroneous information in deciding to suspend the certificate, we will reinstate the certificate.

§1068.435 May I sell engines from an engine family with a suspended certificate of conformity?
You may sell these engines only if one of the following occurs:
(a) You test each engine you produce and show it complies with emission standards that apply.
(b) We conditionally reinstate the certificate for the engine family. We may do so if you agree to recall all the affected engines and remedy any noncompliance at no expense to the owner if later testing shows that the engine family still does not comply.

§1068.440 How do I ask EPA to reinstate my suspended certificate?
(a) Send us a written report in which you identify the reason for noncompliance, propose a remedy, and commit to a date for carrying it out. In your proposed remedy include any quality control measures you propose to keep the problem from happening again.
(b) Give us data from production-line testing that shows the remedied engine family complies with all the emission standards that apply.

§1068.445 When may EPA revoke my certificate under this subpart and how may I sell these engines again?

(a) We may revoke your certificate for an engine family in the following cases:

(1) You don't meet the reporting requirements.

(2) Your engine family fails to meet emission standards and your proposed remedy to address a suspended certificate under §1048.401 is inadequate to solve the problem or requires you to change the engine's design or emission-control system.

(b) To sell engines from an engine family with a revoked certificate of conformity, you must modify the engine family and then show it complies with the applicable requirements.

(1) If we determine your proposed design change may not control emissions for the engine's full useful life, we will tell you within five working days after receiving your report. In this case we will decide whether production-line testing will be enough for us to evaluate the change or whether you need to do more testing.

(2) Unless we require more testing, you may show compliance by testing production-line engines as described in this subpart.

(3) We will issue a new or updated certificate of conformity when you have met these requirements.

§1068.450 What records must I send to EPA?

(a) Within 30 calendar days of the end of each audit, send us a report with the following information:

(1) Describe any facility used to test production-line engines and state its location.

(2) State the total U.S.-directed production volume and number of tests for each engine family.

(3) Describe your test engines, including the engine family's identification and the engine's model year, build date, model number, identification number, and number of hours of operation before testing for each test engine.

(4) Identify where you accumulated hours of operation on the engines and describe the procedure and schedule you used.

(5) Provide the test number; the date, time and duration of testing; test procedure; initial test results before and after rounding; final test results; and final deteriorated test results for all tests. Provide the emission figures for all measured pollutants. Include information for both valid and invalid tests and the reason for any invalidation.

(6) Describe completely and justify any nonroutine adjustment, modification, repair, preparation, maintenance, or test for the test engine if you did not report it separately under this subpart. Include the results of any emission measurements, regardless of the procedure or type of equipment.

(7) Report on each failed engine as described in §1068.425.

(b) We may ask you to add information to your written report, so we can determine whether your new engines conform with the requirements of this subpart.

(c) An authorized representative of your company must sign the following statement:

"We submit this report under Sections 208 and 213 of the Clean Air Act. Our testing conformed completely with the requirements of 40 CFR part 1068. We have not changed production processes or quality-control procedures for the engine family in a way that might affect the emission control from production engines. All the information in this report is true and accurate, to the best of my knowledge. I know of the penalties for violating the Clean Air Act and the regulations." (Authorized Company Representative)

(d) Send reports of your testing to the Designated Officer using an approved information format. If you want to use a different format, send us a written request with justification for a waiver.

(e) We will send copies of your reports to anyone from the public who asks for them. We won't release information about your sales or production volumes, which is all we will consider confidential.

§1068.455 What records must I keep?

(a) We may review your records at any time, so it's important to keep required information readily available. Organize and maintain your records as described in this section.

(b) Keep paper records for testing under this subpart for one full year after you complete all the testing required for the selective enforcement audit. For additional storage, you may use any format or media.

(c) Keep a copy of the written reports described in §1068.450.

(d) Keep the following additional records:

(1) The names of supervisors involved in each test.

(2) The name of anyone who authorizes adjusting, repairing, preparing, or modifying a test engine and the names of all supervisors who oversee this work.

(3) If you shipped the engine for testing, the date you shipped it, the associated storage or port facility, and the date the engine arrived at the testing facility.

(4) Any records related to your audit that are not in the written report.

(5) A brief description of any significant events during testing not otherwise described in the written report or in this section.

(e) If we ask, you must give us projected or actual production for an engine family. Include each assembly plant if you produce engines at more than one plant.

(f) We may ask you to keep or send other information necessary to implement this subpart.

Appendix A to Subpart G of Part 1068—Plans for Selective Enforcement Auditing

Table A-1.—Sampling Plan Code Letter

Projected Engine Family Sales	Code letter[1]	Minimum Number of Tests		Maximum Number of Tests
		To Pass	To Fail	
20 - 50	AA	3	5	20
20 - 99	A	4	6	30
100 - 299	B	5	6	40
300 - 499	C	5	6	50
500 +	D	5	6	60

[1] A manufacturer may optionally use either the sampling plan for code letter "AA" or sampling plan for code letter "A" for Selective Enforcement Audits of engine families with annual sales between 20 and 50 engines. Additionally, the manufacturer may switch between these plans during the audit.

Table A-2—Sampling Plans for Different Engine Family Sales Volumes

Stage	AA		A		B		C		D	
	Pass #	Fail #	Pass #	Fail #	Pass #	Fail #	Pass #	Fail #	Pass #	Fail #
1	—	—	—	—	—	—	—	—	—	—
2	—	—	—	—	—	—	—	—	—	—
3	0	—	—	—	—	—	—	—	—	—
4	0	—	0	—	—	—	—	—	—	—
5	1	5	0	—	0	—	0	—	0	—
6	1	6	1	6	1	6	0	6	0	6
7	2	6	1	7	1	7	1	7	1	7
8	2	7	2	7	2	7	2	7	2	8
9	3	7	2	8	2	8	2	8	2	8
10	3	8	3	8	3	8	3	9	3	9
11	4	8	3	8	3	9	3	9	3	9
12	4	9	4	9	4	9	4	10	4	10
13	5	9	5	10	4	10	4	10	4	10
14	5	10	5	10	5	10	5	11	5	11
15	6	10	6	11	5	11	5	11	5	11
16	6	10	6	11	6	12	6	12	6	12
17	7	10	7	12	6	12	6	12	6	12
18	8	10	7	12	7	13	7	13	7	13
19	8	10	8	13	8	13	7	13	7	13
20	9	10	8	13	8	14	8	14	8	14
21			9	14	9	14	8	14	8	14
22			10	14	9	15	9	15	9	15
23			10	15	10	15	10	15	9	15
24			11	15	10	16	10	16	10	16

Stage	AA		A		B		C		D	
	Pass #	Fail #	Pass #	Fail #	Pass #	Fail #	Pass #	Fail #	Pass #	Fail #
25			11	16	11	16	11	16	11	16
26			12	16	11	17	11	17	11	17
27			12	17	12	17	12	17	12	17
28			13	17	12	18	12	18	12	18
29			14	17	13	18	13	18	13	19
30			16	17	13	19	13	19	13	19
31					14	19	14	19	14	20
32					14	20	14	20	14	20
33					15	20	15	20	15	21
34					16	21	15	21	15	21
35					16	21	16	21	16	22
36					17	22	16	22	16	22
37					17	22	17	22	17	23
38					18	22	18	23	17	23
39					18	22	18	23	18	24
40					21	22	19	24	18	24
41							19	24	19	25
42							20	25	19	26
43							20	25	20	26
44							21	26	21	27
45							21	27	21	27
46							22	27	22	28
47							22	27	22	28
48							23	27	23	29
49							23	27	23	29
50							26	27	24	30
51									24	30
52									25	31
53									25	31
54									26	32
55									26	32
56									27	33
57									27	33
58									28	33
59									28	33
60									32	33

*Stage refers to the cumulative number of engines tested.

Subpart F—Defect Reporting and Recall

§1068.501 How do I report engine defects?

(a) As an engine manufacturer, if you learn that an emission-related defect exists in the number of engines identified as Number to Submit Defect Report in Table 1 of §1068.501, you must send the Designated Officer a report within 15 working days and follow the other instructions in this section. This requirement applies whether you learn of the defects from a method you established to track safety or performance characteristics, from the investigation procedures set forth in subpart (d), or from any other information.

(1) Include each occurrence of the defect in the count of engines, rather than limiting it to individual engine families or a single model year.

(2) Include all defects you observe for the following periods:

(i) For engines with rated power under 225 kW, five years from the end of each engine's model year.

(ii) For engines with rated power 225 kW or greater, eight years from the end of each engine's model year.

(3) Count an engine even if you correct the defect before it reaches the ultimate buyer.

Table 1 of §1068.501
Number of Engines for Filing Report or Commencing Investigation

Number. of Engines in Family	If Component is Anything but a Catalyst		If Component is a Catalyst	
	Number to Commence Investigation	Number to Submit Defect Report	Number to Commence Investigation	Number to Submit Defect Report
10,000	400	25	200	13
20,000	800	50	400	25
30,000	1,200	75	600	38
40,000	1,600	100	800	50
50,000	2,000	125	1,000	63
60,000	2,400	150	1,200	75
70,000	2,800	175	1,400	88
80,000	3,200	200	1,600	100
90,000	3,600	225	1,800	113
100,000	4,000	250	2,000	125
200,000 or more	4000	250	2000	125

(b) Include the following information in your report (in this general outline format):

(1) State your corporate name.

(2) Describe the defect.

(3) Describe which engines may have the defect, including engine model, range of production dates, purchaser, and any other information that may be needed to identify the affected engines.

(4) Estimate the number of each class or category of affected engines that have or may have the defect and explain how you determined this number.

(5) Identify where you produced each class or category of affected engines.

(6) Evaluate the emissions impact of the defect

(7) Describe any operational or performance problems a defective engine might have.

(8) Include any available emission data related to the defect.

(9) Describe your plan for addressing the defect.

(c) If you revise or later obtain information required by paragraph (b) of this section, send it to us as it becomes available.

(d) As an engine manufacturer, you must conduct an investigation to determine if an emission-related defect exists in the Number to Submit Defect Report or more of your engines as follows:

(1) If any of the following contingencies occur you must start an investigation to determine if a defect exists in the Number to Submit Defect Report or more of your engines:

(i) The number of Federal warranty claims for a specific emission-related component is at the

number identified as the Number to Commence an Investigation in Table 1 of this section. Federal warranty claims are warranty claims submitted pursuant to any warranty established under Title II of the Clean Air Act or other warranty applicable to an emission-related device or element of design as specified in Appendix VIII of 40 CFR part 85.

(ii) Systems you have for monitoring information from dealers, hot line complaints, or other information systematically submitted, indicates a higher than normal occurrence of potential defects in an emission-related component or element of design.

(iii) Any other information indicates that there may be a defect in an emission-related component or element of design.

(2) If any of the contingencies set forth above occur, then you shall promptly commence and conduct an investigation to determine if a specific emission-related defect exists and if it is present in the Number to Submit Defect Report or more engines. The investigation shall be performed in a thorough manner, shall include consideration of all relevant information, and shall be conducted in accordance with scientific and engineering principles. Relevant information to be considered shall include information on design, function, rate of failure, use, and any other information available to you.

(3) If an investigation concludes with the determination that there is not an emission-related defect in at least as many engines as the Number to Submit Defect Report, then you shall make a determination whether to commence a continued investigation. A continued investigation should be commenced if there is an indication that there may be new information which would indicate the existence of an emission related-defect in the Number to Submit Defect Report or more engines.

(4) Even if an investigation is being conducted or in any other event, if you have actual knowledge of an emission-related defect in the Number to Submit Defect Report or more of your engines, you must timely submit a report to the Designated Officer, as set forth in (a) above.

§1068.505 How does the recall program work?

(a) If we determine that a substantial number of properly maintained and used engines don't meet the requirements of this chapter throughout their useful life, we will tell you in writing. Our notice will identify the class or category of engines affected and describe how we reached our conclusion. If this happens, you must meet the requirements and follow the instructions in this subpart. You must remedy at your expense noncompliant engines that have been properly maintained and used. You may not transfer this expense to a dealer or equipment manufacturer through a franchise or other agreement.

(b) You may ask for a hearing if you disagree with our determination (see §1068.601)

(c) Unless we withdraw the determination of noncompliance, you must respond to it by sending a remedial plan to the Designated Officer by the later of these two deadlines:

(1) Within 60 days after we notify you.

(2) Within 60 days after a public hearing.

(d) If you learn that your engine family doesn't meet the requirements of this chapter and we haven't ordered you to recall noncomplying engines, you may voluntarily recall them, as described in §1068.535.

(e) Once you have sold an engine to the ultimate purchaser, we may inspect or test the engine only if he or she permits it, or if state or local inspection programs separately provide for it.

§1068.510 How do I prepare and apply my remedial plan?

(a) In your remedial plan, describe all of the following:

(1) The class or category of engines to be recalled, including the number of engines involved and the model year or other information needed to identify the engines.

(2) The modifications, alterations, repairs, corrections, adjustments, or other changes you will make to correct the affected engines.

(3) A brief description of the studies, tests, and data that support the effectiveness of the remedy you propose to use.

(4) The instructions you'll send to those who will repair the engines under the remedial plan.

(5) How you will determine the owners' names and addresses.

(6) How you will notify owners; include copies of any notification letters.

(7) The proper maintenance or use you will specify, if any, as a condition to be eligible for repair under the remedial plan. Describe how owners should show they meet your conditions.
(8) The steps owners must take for you to do the repair. You may set a date or a range of dates, specify the amount of time you need, and designate certain facilities to do the repairs.
(9) Which company (or group) you will assign to do or manage the repairs.
(10) If your employees or authorized warranty agents won't be doing the work, state who will and say they can do it.
(11) How you will ensure an adequate and timely supply of parts.
(12) The effect of proposed changes on fuel consumption, driveability, and safety of the engines you will recall; include a brief summary of the information supporting these conclusions.
(13) How you intend to label the engines you repair and where you'll place the label on the engine (see §1068.515).

(b) We may require you to add information to your remedial plan.
(c) We may require you to test the proposed repair to show it will remedy the noncompliance.
(d) Use all reasonable means to locate owners. We may require you to use government or commercial registration lists to get owners' names and addresses, so your notice will be effective.
(e) The maintenance or use that you specify as a condition for eligibility under the remedial plan may include only things you can show would cause noncompliance. Don't require use of a component or service identified by brand, trade, or corporate name, unless we approved this approach with your original certificate of conformity. Also, don't place conditions on who maintained the engine.
(f) We may require you to adjust your repair plan if we determine owners would be without their engines or equipment for an unreasonably long time.
(g) We will tell you in writing within 15 days of receiving your remedial plan whether we have approved or disapproved it. We will explain our reasons for any disapproval.
(h) Begin notifying owners within 15 days after we approve your remedial plan. If we hold a public hearing, but don't change our position about the noncompliance, you must begin notifying owners within 60 days after we complete the hearing, unless we specify otherwise.

§1068.515 How do I mark or label repaired engines?
(a) Attach a label to each engine you repair under the remedial plan. At your discretion, you may label or mark engines you inspect but don't repair.
(b) Make the label from a durable material suitable for its planned location. Make sure no one can remove the label without destroying it.
(c) On the label, designate the specific recall campaign and state where you repaired or inspected the engine.
(d) We may waive or modify the labeling requirements if we determine they are overly burdensome.

§1068.520 How do I notify affected owners?
(a) Notify owners by first class mail, unless we say otherwise. We may require you to use certified mail. Include the following things in your notice:
(1) State: "The U.S. Environmental Protection Agency has determined that your engine may be emitting pollutants in excess of the Federal emission standards, as defined in Title 40 of the Code of Federal Regulations. These emission standards were established to protect the public health or welfare from air pollution."
(2) State that you (or someone you designate) will repair these engines at your expense.
(3) If we approved maintenance and use conditions in your remedial plan, state that you will make these repairs only if owners show their engines meet the conditions for proper maintenance and use. Describe these conditions and how owners should prove their engines are eligible for repair.
(4) Describe the components your repair will affect and say generally how you will repair the engines.
(5) State that the engine, if not repaired, may fail an emission inspection test if state or local law requires one.
(6) Describe how not repairing the engine will harm its performance or driveability.
(7) Describe how not repairing the engine will harm the functions of other engine components.

(8) Specify the date you'll start the repairs, the amount of time you'll need to do them, and where you'll do them. Include any other information owners may need to know.

(9) Include a self-addressed card that owners can mail back if they have sold the engine (or equipment in which the engine is installed); include a space for owners to write the name and address of a buyer.

(10) State that owners should call you at a phone number you give to report any difficulty in obtaining repairs.

(11) State: "To ensure your full protection under the emission warranty on your engine by federal law, and your right to participate in future recalls, we recommend you have your engine serviced as soon as possible. We may consider your not servicing it to be improper maintenance."

(b) We may require you to add information to your notice or to send more notices.

(c) You may not in any communication with owners or dealers say or imply that your noncompliance doesn't exist or that it won't degrade air quality.

§1068.525 What records must I send to EPA?

(a) Send us a copy of all communications related to the remedial plan you sent to dealers and others doing the repairs. Mail or e-mail us the information at the same time you send it to others.

(b) From the time you begin to notify owners, send us a report within 25 days of the end of each calendar quarter. Send reports for six consecutive quarters or until all the engines are inspected, whichever comes first. In these reports, identify the following:

(1) The range of dates you needed to notify owners.

(2) The total number of notices sent.

(3) The number of engines you estimate fall under the remedial plan (explain how you determined this number).

(4) The cumulative number of engines you inspected under the remedial plan.

(5) The cumulative number of these engines you found needed the specified repair.

(6) The cumulative number of these engines you have repaired.

(7) The cumulative number of engines you determined to be unavailable due to exportation, theft, retirement, or other reasons (specify).

(8) The cumulative number of engines you disqualified for not being properly maintained or used.

(c) If your estimated number of engines falling under the remedial plan changes, change the estimate in your next report and add an explanation for the change.

(d) We may ask for more information.

(e) We may waive reporting requirements or adjust the reporting schedule.

(f) If anyone asks to see the information in your reports, we will follow the provisions of §1068.010 for handling confidential information.

§1068.530 What records must I keep?

We may review your records at any time, so it's important that you keep required information readily available. Keep records associated with your recall campaign for three years after you complete your remedial plan. Organize and maintain your records as described in this section.

(a) Keep a paper copy of the written reports described in §1068.525.

(b) Keep a record of the names and addresses of owners you notified. For each engine, state whether you did any of the following:

(1) Inspected the engine.

(2) Disqualified the engine for not being properly maintained or used.

(3) Completed the prescribed repairs.

(c) You may keep the records in paragraph (b) of this section in any form we can inspect, including computer databases.

§1068.535 How can I do a voluntary recall for emission-related problems?

(a) To do a voluntary recall, first send the Designated Officer a plan, following the guidelines in §1068.510. Within 15 days, we will send you our comments on your plan.

(b) Once we approve your plan, start notifying owners and carrying out the specified repairs.

(c) From the time you start the recall campaign, send us a report within 25 days of the end of each calendar quarter, following the guidelines in §1068.525(b). Send reports for six consecutive quarters or until all the engines are inspected, whichever comes first.

(d) Keep your reports and the supporting information as described in §1068.530.

§1068.540 What terms do I need to know for this subpart?

Days means calendar days.

Owner means someone who owns an engine affected by a remedial plan or someone who owns a piece of equipment that has one of these engines.

Subpart G—Public Hearings

§1068.601 How do I request a public hearing?

(a) File a request for a hearing with the Designated Officer within 15 days of a decision to suspend, revoke, or void your certificate or within 30 days after we send you our conclusions for rejecting your use of good engineering judgment. If you ask later, we may give you a hearing for good cause, but we don't have to.

(b) Include the following in your request for a public hearing:

(1) State which engine family is involved.

(2) State the issues you intend to raise. We may limit these issues, as described elsewhere in the regulations.

(3) Summarize the evidence supporting your position and state why you believe this evidence justifies reinstating the certificate.

(c) We will hold the hearing as described in this subpart.

§1068.605 How will EPA set up a public hearing?

(a) A Presiding Officer and one or more Judicial Officers will hold public hearings.

(b) Presiding Officers must be an administrative law judge appointed according to 5 U.S.C. 3105 (see also 5 CFR part 930, as amended).

(c) The Administrator will appoint EPA employees as Judicial Officers. Judicial Officers must meet the following qualifications and perform the following functions.

(1) Qualifications. Judicial Officers may be permanent or temporary employees of EPA who handle other duties for the Agency. Judicial Officers may not be employed by the Office of Enforcement and Compliance Assurance or have any connection with preparing or presenting evidence for any hearing held under this section. Judicial Officers must be graduates of an accredited law school and members in good standing of a recognized bar association of any state or the District of Columbia.

(2) Functions. The Administrator may consult with the Judicial Officers or delegate all or part of the Administrator's authority to act under this section to the Officers. But the Officers must be able to refer any motion or case to the Administrator whenever appropriate.

(d) We may determine that your request for a hearing does not raise a genuine, substantial question of fact or law concerning suspension of your certificate of conformity. If so, we may enter an order denying your request and reaffirm the suspension or revocation. This order has the force and effect of the Administrator's final decision.

(1) In the case of emission levels causing an engine family to be noncompliant, you may question only our decision on whether the tests and sampling methods were proper.

(2) In the case of violations of prohibited acts, you may question only our decision on whether conditions or circumstances outside your control caused your refusal to comply with the requirements of this chapter.

(e) If we determine you have raised a genuine, substantial question of fact or law under paragraphs (d)(1) and (d)(2) of this section, we will grant your request for a hearing. We will tell the public by publishing a notice in the Federal Register or by some other appropriate means.

(f) File with our Hearing Clerk an original and two copies of all documents or papers you must (or may) file. Your filing is timely if you deliver or postmark items within the time this section and any other regulations allow. We will give you an address for filing materials with the Hearing Clerk.

(g) Present testimony in writing as much as possible. We will give everyone copies of written testimony as soon as we can before the hearing starts. We will provide a certificate of service for each document or paper filed with the Hearing Clerk. If you need to give something to the Designated Officer, send it by registered mail (see §1068.025).

(h) In computing any period of time for this section, don't include the day of the act or event. Include Saturdays, Sundays, and federal legal holidays, but when the period expires on one of these days, extend it to include the next business day. If you must or may do something within a prescribed period, compute this period from the time we notify you, unless we notify you by mail. For notices by mail, add three days to the prescribed period.

(g) The Administrator or Presiding Officers may consolidate two or more proceedings held under this section to speed or simplify resolving one or more issues. You may still raise issues that you could have raised if we didn't consolidate proceedings.

(h) As much as possible, we will schedule public hearings to start within 14 days after we receive a request for a hearing.

§1068.610 What are the procedures for a public hearing?

(a) Presiding Officers. Presiding Officers must hold fair and impartial hearings under 5 U.S.C. 554, 556, and 557; dispose of the proceedings as soon as possible; and maintain order. They have power consistent with our rules and the Administrative Procedures Act, including the power to do the following:

(1) Administer oaths and affirmations.

(2) Rule on offers of proof and exclude irrelevant or repetitious material.

(3) Regulate the course of the hearing and the conduct of the parties and their counsel.

(4) Hold conferences.

(5) Consider and rule on all procedural and other motions in the hearing.

(6) Require submission of direct written testimony with or without affidavit whenever, in their opinion, oral testimony is not necessary for full and true disclosure of the facts.

(7) Enforce agreements and orders requiring access as authorized by law.

(8) Require the filing of briefs on any matter on which they must rule.

(9) Require any party or witness to state a position on any issue during the hearing.

(10) Depose witnesses or require depositions.

(11) Resolve or recommend resolution for disputed issues on the hearing's record.

(12) Issue protective orders, as described in paragraph (g) of this section, based on good cause.

(b) Accelerated decision or dismissal. Presiding Officers may accelerate decisions on all or part of the proceeding, without further hearing or with limited additional evidence (such as affidavits they may require). They may also dismiss any party with prejudice.

(1) Presiding Officers may decide in favor of EPA or you (as manufacturer), based on any party's motion or their own judgment, for any of the following reasons:

(i) Failure to state a claim on which relief can be granted or stating something that contradicts a previous statement.

(ii) The lack of any genuine, material issue, so a party is entitled to judgment as a matter of law.

(iii) Failure to obey a procedural order of the Presiding Officer.

(iv) Other just reasons.

(2) A Presiding Officer's accelerated decision on all the issues and claims in the proceeding is equal to the decision described in paragraph (l) of this section.

(3) For accelerated decisions on less than all issues or claims in the proceeding, the Presiding Officers must determine without substantial controversy which material facts exist and which are in good faith controverted. Then, they issue an order specifying the facts that are without substantial controversy, as well as the issues and claims on which the hearing will continue.

(c) Amicus curiae (friend of the court). Participants in the hearing may move that the Presiding Officer allow a brief from a friend of the court— someone who is not a participant. Anyone who asks for an amicus brief must identify his or her interest and state why the brief is desirable. The Presiding Officer may then accept briefs from someone who is not a party to the proceeding.

(d) Conferences. Presiding Officers may hold conferences before ordering any hearing. They direct the Hearing Clerk to tell participants the time and location of conferences. At the Presiding Officer's discretion, other people also may attend. They summarize in writing the results of conferences, including all stipulations not transcribed, and summaries part of the record. At a conference, Presiding Officers may do any of the following:

(1) Get stipulations and admissions, receive requests, order depositions to be taken, identify disputed issues of fact and law, and require or allow any witness or party to submit written testimony.

(2) Set a hearing schedule for oral and written statements, submission of written direct testimony, oral direct examination and cross-examination of a witness, or oral argument as they consider necessary.

(3) Identify matters for official notice.

(4) Limit the number of expert and other witnesses.

(5) Establish the procedures for the hearing.

(6) Take any other action that may speed the hearing or help resolve the issue.

(e) Primary discovery. At a prehearing conference or at some other time a Presiding Officer sets before the hearing, all parties must make available to the other parties the names of the expert and other witnesses they expect to call, a brief summary of their expected testimony, and a list of all documents and exhibits they expect to introduce into evidence. After that, a party may move to add exhibits or amend expected testimony. If anyone makes a motion showing good cause, Presiding Officers may restrict or defer disclosure of the name of a witness or a narrative summary of the witness's expected testimony. They also may prescribe other measures to protect a witness. If restricted or deferred disclosure affects a party, they will allow enough time to prepare for presenting that case.

(f) Other discovery. Presiding Officers may allow further discovery. If so, they issue orders for taking the discovery, including terms and conditions.

(1) Any party may move for further discovery, as long as the motion includes reasons, the nature of the information discovery will produce, and the proposed time and place for it.

(2) Presiding Officers may approve motions for further discovery if they determine it won't unreasonably delay the proceeding, is the only way to get the information, and is significant to the case. Presiding Officers follow procedures in the Federal Rules of Civil Procedure and its precedents whenever possible. But no one can take discovery unless a Presiding Officer orders it or all the parties agree to it.

(3) If someone does not comply with an order issued under this paragraph (f), we may infer that the discovery information would harm that person.

(g) Protective orders for private discovery. Presiding Officers may enter protective orders to allow a person to testify or disclose information in private, rather than in open hearing.

(1) For this to occur, a party or the person giving discovery information must move for a protective order by showing that some of the discovery information would reveal methods or processes entitled to protection as trade secrets. This information may not include emission data. Any party wanting to use private documents or testimony to present a case must so move to the Presiding Officer with supporting justification.

(2) Presiding Officers may permit anyone seeking a protective order to disclose information in private. They will record the private proceeding . If they enter a protective order following a private session, they will seal and preserve the record and make it available to EPA or the court if anyone appeals. The Presiding Officer may limit attendance at any private proceeding to himself or herself, EPA, and the person or party seeking the protective order.

(3) If Presiding Officers grant a motion for a protective order, they enter an order that governs treatment of the information to protect the parties' rights and prevent unnecessary disclosure. Procedures also cover presentation of the information and oral testimony and related cross-examination in executive session. The protective order must also state that the material will be filed separately from other evidence and exhibits in the hearing.

(4) Disclosing this information is limited to parties to the hearing, their counsel and relevant technical consultants, and authorized representatives of the United States concerned with carrying out the Act. Disclosure by government employees must follow 18 U.S.C. 1905. For all others, disclosure may be limited to counsel if the parties don't have to know the information. Parties or their counsel must sign a sworn statement that they will not disclose information to persons not entitled to receive it under the protective order's terms.

(5) In the submittal of proposed findings, briefs, or other papers, counsel for all parties must try in good faith not to disclose the specific details of private documents and testimony. But they may refer to the documents or testimony and speak generally about their contents If lawyers consider specific details necessary to their presentations, they will place the details in separate proposed findings, briefs, or other paper marked "confidential." These confidential papers will become part of the private record.

(h) Motions. All motions, except those made orally during the hearing, must be in writing. Parties must state the grounds for the motion, describe the relief or order sought, file the motion with the Hearing Clerk, and serve it on all parties.

(1) Within the time fixed by the Environmental Appeals Board or Presiding Officers, as appropriate, any party may serve and file an answer to the motion. The Environmental Appeals Board or Presiding Officers may then require the person who made the motion to file reply papers within a specified time.

(2) Presiding Officers rule on all motions filed or made before they file their decisions (or accelerated

decisions). The Environmental Appeals Board rules on all motions filed before Presiding Officers are appointed and on all motions filed after Presiding Officers issue decisions. Presiding Officers or the Environmental Appeals Board approve oral arguing of motions only when necessary.

(i) Evidence. Evidence consists of official transcripts and exhibits, together with all papers and requests filed in the proceeding. Presiding Officers will separate and exclude immaterial or irrelevant parts of an admissible document whenever possible. They will also separate documents (or parts of documents) subject to a protective order under paragraph (g) of this section. They may allow evidence at the hearing even though it is inadmissible under the rules of evidence for judicial proceedings. The weight of evidence depends on its reliability and how well it proves a case. Presiding Officers allow parties to examine and cross-examine witnesses as much as necessary for a full disclosure of the facts. Their rulings on admissibility of evidence, propriety of examination and cross-examination, and other procedural matters will appear in the record. We automatically assume parties have taken exception to an adverse ruling.

(j) The record. The record consists of official transcripts and exhibits, together with all paper and requests filed in the proceeding. Stenographers will report and transcribe hearings; the original transcripts are part of the record and are the sole official transcript. We will file copies of the record with the Hearing Clerk and make them available during our business hours for public inspection. We may charge a reasonable fee for the service, but may deny a request to see information only based on paragraph (g) of this section.

(k) Proposed findings and conclusions. Within four days after the proceedings are closed to new evidence, any party may submit for the Presiding Officer's consideration proposed findings of fact, conclusions of law, or a proposed order, with supporting reasons and briefs. The Presiding Officer may allow a longer time for these proposals. Parties must put these proposals in writing, serve them on all parties, and make sure they contain clear references to the record and other authorities. The record shows the Presiding Officer's ruling on the proposed findings and conclusions, except when the disposal order for the proceeding otherwise informs the parties of these actions.

(l) Presiding Officer's decisions. Presiding Officers issue and file decisions with the Hearing Clerk within fourteen days after the period for filing proposed findings (see paragraph (k) of this section). For hearings that challenge an initial suspension of a certificate of conformity, decisions are due within seven days after the period for filing proposed findings. The Environmental Appeals Board may extend the deadline for these decisions.

(1) Decisions must state findings and conclusions on all the material issues of fact or law in the record, with supporting reasons or basis, and an appropriate rule or order. Evidence and consideration of the whole record must support the decision.

(2) Decisions by Presiding Officers become the Environmental Appeals Board's decisions at one of the following times, unless the Board acts to review or stay the effective date of a decision during these periods:

(i) Ten days after the deadlines to appeal, as described in §1068.615(a) or (b), if no one files a notice of intent to appeal.

(ii) Five days after the deadline to perfect an appeal, as described in §1068.615(a) or (b), if someone files a notice of intent to appeal but doesn't perfect the appeal.

(3) At any time before Presiding Officers issue decisions, they may reopen proceedings to receive further evidence.

(4) Except for correcting clerical errors, the Presiding Officers' jurisdiction ends when they issue their decisions.

§1068.615 How do I appeal a hearing decision?

(a) Appeal from the decisions of Presiding Officers. Any party to a proceeding may appeal these decisions to the Environmental Appeals Board. In all cases except our initial suspension of a certificate of conformity, you must file your notice of intent to appeal within ten days after the Presiding Officer issues a decision. You must perfect your appeal with an appeal brief within twenty days of the decision. Any other party may then file a brief on your appeal within fifteen days of the date you file your brief. All briefs must be 40 pages or less, unless the Environmental Appeals Board approves otherwise. The Board also may allow oral arguments. Your brief must contain the following items in this order:

(1) A subject index of the matter in the brief, with page references, plus a table of cases (alphabetically arranged), textbooks, statutes, and other material cited, with page references.

(2) Specific issues you intend to urge (but see regulations defining emission standards for the engines in question, which may limit the range of issues you consider).

(3) Your argument presenting the points of fact and law supporting the position you have taken on each issue, with page references to the record and legal or other material you are relying on.

(4) A proposed order for the Environmental Appeals Board's consideration, if it is different from the order in the Presiding Officer's decision.

(b) Appeal of decisions on a suspended certificate of conformity. In this case, you may appeal the Presiding Officer's decision to the Environmental Appeals Board by filing a notice of appeal within ten days of the decision. Make your notice of appeal a brief that meets the requirements in paragraph (a) of this section. Within ten days after you file a notice of appeal under this paragraph, any other party may file a brief on that appeal. All briefs must be 15 pages or less unless the Environmental Appeals Board approves otherwise.

(c) Review of the Presiding Officer's decision in the absence of appeal. The hearing Clerk tells the Environmental Appeals Board if no one has filed a notice of intent to appeal the Presiding Officer's decision by the deadline, or has filed notice but not perfected it. The Environmental Appeals Board may then review the decision on its own motion, within the time limits in §1068.610(l). The Board must tell all parties that they intend to review the decision, describe the scope of their review, and allow for filing briefs.

(d) Decision of appeal or review by the Environmental Appeals Board. The Board considers the record as needed to resolve issues under appeal or review. They also may use all the powers they could have used if they had presided at the hearing. They adopt, modify, or set aside the Presiding Officer's findings, conclusions, and order and state the reasons or basis for their action in the decision. If the Board determines they need more information or the parties' views on the rule or order they are issuing, they may wait until they receive them or send the case back to the Presiding Officer. Any decision under this paragraph that disposes of a case is the Board's final decision.

(e) Reconsideration of the Environmental Appeals Board's decision. Within 20 days of the Board's decision, you may file a petition with the Board to reconsider their decision.

(1) Your petition must describe the relief you want and the grounds supporting it. Limit your petition to new questions raised by the decision or final order and only those you did not have the chance to argue before the Presiding Officer or the Board. See the regulations defining emission standards for the engines in question, which may further limit the questions the Board will review.

(2) Anyone wanting to oppose this petition may file a response within ten days after you file it.

(3) Your petition for reconsideration does not stay the effective date of the decision or order. It also does not start any statutory time period affecting the decision or order, unless the Environmental Appeals Board orders that it does.

§1068.620 How does a hearing conclude?

(a) Conclusion of hearing. (1) The hearing ends after all periods allowed for appeal and review if no one appeals the Presiding Officer's decision and the Environmental Appeals Board does not move to review the decision by the specified deadlines.

(2) The hearing ends when the Environmental Appeals Board issues a final decision if someone appeals or the Board decides to review the Presiding Officer's decision.

(b) Judicial review. If you want to petition for judicial review, you must serve the petition on EPA's General Counsel. We will then tell you the costs involved. After we receive your payment to cover fees, we will forward your petition to the court where the Environmental Appeals Board filed its order.

Appendix I to Part 1068—Emission Related Components, Parameters, and Specifications

I. Basic Engine Parameters -- Reciprocating Engines.

1. Compression ratio.
2. Type of air aspiration (natural, Roots blown, supercharged, turbocharged).
3. Valves (intake and exhaust).
   a. Head diameter dimension.
   b. Valve lifter or actuator type and valve lash dimension.
4. Camshaft timing.
   a. Valve opening - intake exhaust (degrees from TDC or BDC).
   b. Valve closing - intake exhaust (degrees from TDC or BDC).
   c. Valve overlap (degrees).
5. Ports -- two stroke engines (intake and/or exhaust).
   a. Flow area.
   b. Opening timing (degrees from TDC or BDC).
   c. Closing timing (degrees from TDC or BDC).

II. Intake Air System.

1. Roots blower/supercharger/turbocharger calibration.
2. Charge air cooling.
   a. Type (air-to-air; air-to-liquid).
   b. Type of liquid cooling (engine coolant, dedicated cooling system).
   c. Performance (charge air delivery temperature (°F) at rated power and one other power level under ambient conditions of 80°F and 110°F, and 3 minutes and 15 minutes after selecting rated power, and 3 minutes and 5 minutes after selecting other power level).
3. Temperature control system calibration.
4. Maximum allowable inlet air restriction.

III. Fuel System.

1. General.
   a. Engine idle speed.
2. Carburetion.
   a. Air-fuel flow calibration.
   b. Idle mixture.
   c. Transient enrichment system calibration.
   d. Starting enrichment system calibration.
   e. Altitude compensation system calibration.
   f. Hot idle compensation system calibration.
3. Fuel injection -- spark-ignition engines.
   a. Control parameters and calibrations.
   b. Idle mixture.
   c. Fuel shutoff system calibration.
   d. Starting enrichment system calibration.
   e. Transient enrichment system calibration.
   f. Air-fuel flow calibration.
   g. Altitude compensation system calibration.
   h. Operating pressure(s).
   i. Injector timing calibration.

4. Fuel injection -- compression ignition engines.
    a. Control parameters and calibrations.
    b. Transient enrichment system calibration.
    c. Air-fuel flow calibration.
    d. Altitude compensation system calibration.
    e. Operating pressure(s).
    f. Injector timing calibration.

IV. Ignition System -- spark-ignition engines.

1. Control parameters and calibration.
2. Initial timing setting.
3. Dwell setting.
4. Altitude compensation system calibration.
5. Spark plug voltage.

V. Engine Cooling System.

1. Thermostat calibration.

VI. Exhaust System.

1. Maximum allowable back pressure.

VII. Exhaust Emission Control System.

1. Air injection system.
    a. Control parameters and calibrations.
    b. Pump flow rate.
2. EGR system.
    a. Control parameters and calibrations.
    b. EGR valve flow calibration.
3. Catalytic converter system.
    a. Active surface area.
    b. Volume of catalyst.
    c. Conversion efficiency.
4. Backpressure.

VIII. Crankcase Emission Control System.

1. Control parameters and calibrations.
2. Valve calibrations.

IX. Auxiliary Emission Control Devices (AECD).

1. Control parameters and calibrations.
2. Component calibration(s).

X. Evaporative Emission Control System.

1. Control parameters and calibrations.
2. Fuel tank.

a. Volume.
b. Pressure and vacuum relief settings.