

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 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 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 § 1068.20 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 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 § 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 do not meet emission standards or you do not fulfill your obligations under this subpart (see §§ 1048.325 and 1048.340).

(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 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 your production-line 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+NO_x and for CO. The required sample size is the greater of these two calculated values. Use the following equation:

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

Where:

N = Required sample size for the model year.

t₉₅ = 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, t₉₅, 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		

(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 the

equations in paragraph (c) of this section (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, \bar{x} , is greater than the emission standard. This applies if the sample mean for either HC+NO_x 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, \bar{x} , is less than or equal to the emission standard.

(2) The engine family does not 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 does not 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 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 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+NO_x and for CO emissions):

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

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 the equation

in paragraph (b) of this section (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 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 § 1048.225), do not 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 does not 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 asking us to reinstate your suspended certificate. In your report, 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 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 § 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 will not 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 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 § 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 do not 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 do not 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 do not 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 does not 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 do not 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:

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

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 table in paragraph (i) of this section; this factor is 1.0 if the engine family has an average emission level higher than the emission standard for any pollutant.

(i) Use the following table for the adjustment factor in the equation in paragraph (h) of this section:

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 do not 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 does not comply and notify us within fifteen days of completing testing on this family.
- (c) If you voluntarily test more engine families and these engines do not 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 do not 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 do not 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 do not 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. Do not 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 will not 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 is 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, NO_x, CO, and CO₂ 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 § 1065.10 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 the following table if you certify an engine family for operation only at a single, rated speed:

TABLE 1 OF § 1048.505.—5-MODE DUTY CYCLE FOR CONSTANT-SPEED ENGINES¹

Mode No.	Engine speed	Torque	Minimum time in mode (minutes)	Weighting factors
1	Maximum test	100	5.0	0.05
2	Maximum test	75	5.0	0.25
3	Maximum test	50	5.0	0.30
4	Maximum test	25	5.0	0.30
5	Maximum test	10	5.0	0.10

¹ This duty cycle is analogous to the D2 cycle specified in ISO 8178-4.

(2) Use the 7-mode duty cycle described in the following table for engines from an engine family that will be used only in variable-speed applications:

TABLE 2 OF § 1048.505.—7-MODE DUTY CYCLE¹

Mode No.	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.

(3) Use both of the duty cycles described in paragraphs (a)(1) and (a)(2) of this section if you will not 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.

§ 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, of this chapter describes the equipment and sampling methods for testing engines in the field. Use fuel meeting the specifications of § 1065.210 of this chapter 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 do not 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. The definitions follow:

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.

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.

Good engineering judgment has the meaning we give it in § 1068.5 of this chapter.

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 of this chapter.

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 of this chapter.

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

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 § 1048.5 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 does not 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 § 1048.5, 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 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 § 1068.25 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 § 1048.5).

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 (NO₂). Oxides of nitrogen are expressed quantitatively as if the NO were in the form of NO₂ (assume a molecular weight for oxides of nitrogen equivalent to that of NO₂).

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 § 1068.25 of this

chapter). 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.

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 United States.

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.

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.
 CO₂ 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.
 NO_x oxides of nitrogen (NO and NO₂).
 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

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

(a) *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 follows:

TABLE 1 OF § 1048.710.—ASTM MATERIALS

Document No. and name	Part reference
ASTM E29-93a, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications.	1048.240, 1048.315, 1048.345, 1048.410, 1048.415

(b) *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 follows:

TABLE 2 OF § 1048.710.—ISO MATERIALS

Document No. and name	Part 1048 reference
ISO 9141-2 February 1994, Road vehicles—Diagnostic systems Part 2.	1048.110
ISO 14230-4 June 2000, Road vehicles—Diagnostic systems—KWP 2000 requirements for emission-related systems.	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 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.

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

The following table shows the transient duty-cycle for constant-speed engines, as described in § 1048.510:

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

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
169	93	20	241	94	27	313	93	31
170	93	20	242	93	22	314	93	30
171	93	18	243	93	23	315	93	23
172	93	19	244	93	21	316	93	23
173	93	19	245	93	22	317	93	36
174	93	16	246	95	22	318	93	32
175	93	16	247	95	16	319	93	25
176	93	16	248	95	12	320	93	31
177	93	18	249	95	10	321	93	33
178	93	21	250	95	9	322	93	31
179	93	20	251	95	8	323	93	27
180	93	20	252	96	7	324	93	24
181	93	17	253	95	7	325	93	19
182	93	19	254	95	6	326	96	21
183	93	17	255	92	42	327	96	16
184	93	18	256	93	36	328	95	12
185	93	16	257	93	33	329	95	10
186	93	16	258	92	60	330	95	8
187	93	16	259	93	48	331	95	8
188	93	17	260	93	36	332	95	7
189	93	16	261	93	30	333	95	7
190	93	17	262	93	28	334	95	6
191	93	18	263	93	24	335	95	6
192	93	17	264	93	24	336	95	6
193	93	16	265	93	23	337	87	6
194	93	17	266	93	23	338	57	6
195	93	17	267	93	25	339	58	6
196	93	22	268	93	27	340	58	6
197	93	19	269	93	29	341	58	6
198	93	19	270	93	26	342	58	6
199	95	21	271	93	26	343	58	6
200	95	16	272	93	21	344	58	6
201	95	12	273	93	23	345	58	6
202	95	10	274	93	23	346	58	6
203	96	8	275	94	23	347	58	6
204	96	7	276	93	40	348	58	6
205	95	7	277	94	67	349	58	6
206	96	7	278	93	46	350	58	6
207	95	6	279	93	38	351	58	6
208	96	6	280	93	29	352	95	73
209	96	6	281	93	28	353	93	65
210	88	6	282	93	27	354	93	52
211	89	48	283	93	29	355	93	38
212	93	34	284	93	28	356	93	30
213	93	27	285	94	34	357	93	31
214	93	26	286	93	31	358	93	26
215	93	25	287	93	30	359	93	21
216	93	22	288	94	42	360	93	22
217	93	23	289	93	31	361	93	26
218	93	21	290	93	29	362	93	23
219	93	21	291	93	27	363	93	19
220	93	23	292	93	23	364	93	27
221	93	23	293	93	23	365	93	42
222	93	23	294	93	20	366	93	29
223	93	23	295	93	20	367	94	25
224	93	23	296	93	23	368	94	26
225	93	22	297	93	23	369	94	29
226	93	22	298	93	24	370	93	28
227	93	24	299	93	25	371	93	23
228	93	23	300	93	20	372	93	21
229	93	23	301	93	25	373	93	26
230	93	21	302	93	23	374	93	23
231	93	20	303	93	23	375	93	20
232	93	20	304	93	24	376	94	23
233	93	20	305	93	28	377	93	18
234	93	22	306	93	23	378	93	19
235	93	26	307	93	24	379	93	23
236	93	22	308	93	34	380	93	19
237	93	20	309	93	31	381	93	16
238	93	18	310	93	35	382	93	25
239	93	22	311	93	31	383	93	22
240	93	20	312	93	32	384	93	20

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
385	93	25	457	93	36	529	93	25
386	94	28	458	93	28	530	93	21
387	93	23	459	93	25	531	93	17
388	93	23	460	93	35	532	93	15
389	93	25	461	93	34	533	93	15
390	93	23	462	93	29	534	93	16
391	93	20	463	93	37	535	93	15
392	93	19	464	93	36	536	93	14
393	93	24	465	93	38	537	93	15
394	93	20	466	93	31	538	93	16
395	93	18	467	93	29	539	94	15
396	93	21	468	93	34	540	93	45
397	95	22	469	93	36	541	93	45
398	96	16	470	93	34	542	93	41
399	96	12	471	93	31	543	93	33
400	95	10	472	93	26	544	93	26
401	96	9	473	93	21	545	93	21
402	95	8	474	94	16	546	93	20
403	96	7	475	96	19	547	93	17
404	96	7	476	96	15	548	93	16
405	96	6	477	95	11	549	93	17
406	96	6	478	96	10	550	93	16
407	95	6	479	95	8	551	93	14
408	91	6	480	95	7	552	93	16
409	58	6	481	95	7	553	93	15
410	58	6	482	96	7	554	93	14
411	58	6	483	96	6	555	93	16
412	58	6	484	96	6	556	93	15
413	58	6	485	95	6	557	93	14
414	58	6	486	85	6	558	93	13
415	58	6	487	56	74	559	93	14
416	58	6	488	93	52	560	93	14
417	58	6	489	93	42	561	93	15
418	58	6	490	93	36	562	93	17
419	58	6	491	93	35	563	93	17
420	58	6	492	93	33	564	93	22
421	58	6	493	93	38	565	93	22
422	58	6	494	93	40	566	93	19
423	58	6	495	93	29	567	93	19
424	58	6	496	93	23	568	93	20
425	58	6	497	93	23	569	93	18
426	58	6	498	93	24	570	93	20
427	58	6	499	93	24	571	93	20
428	58	6	500	93	20	572	93	42
429	58	6	501	93	19	573	93	32
430	58	6	502	93	16	574	93	25
431	58	6	503	93	21	575	93	26
432	58	6	504	93	23	576	93	23
433	58	6	505	93	24	577	93	21
434	58	6	506	93	22	578	93	23
435	58	6	507	93	18	579	93	19
436	58	6	508	93	21	580	93	21
437	58	6	509	95	18	581	93	20
438	58	6	510	95	20	582	93	20
439	58	6	511	95	15	583	93	20
440	58	6	512	96	11	584	93	18
441	58	6	513	95	10	585	93	18
442	58	6	514	96	8	586	93	21
443	93	66	515	95	7	587	93	19
444	93	48	516	95	7	588	93	21
445	93	40	517	95	7	589	93	19
446	93	34	518	95	6	590	93	19
447	93	28	519	96	6	591	93	18
448	93	23	520	96	6	592	93	18
449	93	28	521	83	6	593	93	17
450	93	27	522	56	6	594	93	16
451	93	23	523	58	6	595	93	16
452	93	19	524	72	54	596	93	15
453	93	25	525	94	51	597	93	16
454	93	24	526	93	42	598	93	19
455	93	22	527	93	42	599	93	52
456	93	31	528	93	31	600	93	45

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
601	95	39	673	95	22	745	95	27
602	95	39	674	95	19	746	95	22
603	95	39	675	94	17	747	95	18
604	95	39	676	95	27	748	95	19
605	94	30	677	95	24	749	95	25
606	95	30	678	98	19	750	94	25
607	95	29	679	98	19	751	95	21
608	95	24	680	98	14	752	95	22
609	94	30	681	98	11	753	95	27
610	95	28	682	98	9	754	95	27
611	94	25	683	98	8	755	95	27
612	94	29	684	98	7	756	95	24
613	95	32	685	98	6	757	94	20
614	95	33	686	98	6	758	94	23
615	95	44	687	98	6	759	94	26
616	99	37	688	98	6	760	95	25
617	98	27	689	98	5	761	95	25
618	98	19	690	81	5	762	95	21
619	98	13	691	49	5	763	95	28
620	98	11	692	78	48	764	94	39
621	98	9	693	95	37	765	95	32
622	98	7	694	95	31	766	95	24
623	98	7	695	94	32	767	95	19
624	98	6	696	94	34	768	98	20
625	98	6	697	95	29	769	98	17
626	98	6	698	95	25	770	98	12
627	98	5	699	94	26	771	98	10
628	69	6	700	95	28	772	98	8
629	49	5	701	95	27	773	98	7
630	51	5	702	94	28	774	98	6
631	51	5	703	95	30	775	98	6
632	51	5	704	95	27	776	95	61
633	51	6	705	95	26	777	94	51
634	51	6	706	95	27	778	95	40
635	51	6	707	95	25	779	94	35
636	51	6	708	95	26	780	94	36
637	51	5	709	95	25	781	94	32
638	51	5	710	95	23	782	95	24
639	51	5	711	95	20	783	94	19
640	51	5	712	95	23	784	94	19
641	51	6	713	95	20	785	95	19
642	51	6	714	95	18	786	95	19
643	51	6	715	94	22	787	94	18
644	51	6	716	95	19	788	94	20
645	51	5	717	95	23	789	94	23
646	51	6	718	95	27	790	94	22
647	51	5	719	95	26	791	95	23
648	51	6	720	95	23	792	94	20
649	51	5	721	95	20	793	94	18
650	96	35	722	99	23	794	95	16
651	95	29	723	98	20	795	95	17
652	95	26	724	98	14	796	94	16
653	95	31	725	98	11	797	94	16
654	95	34	726	98	9	798	94	17
655	95	29	727	98	8	799	94	18
656	95	29	728	98	7	800	94	21
657	95	30	729	98	6	801	95	21
658	95	24	730	98	6	802	94	19
659	95	19	731	98	6	803	95	18
660	95	23	732	98	5	804	94	19
661	95	21	733	98	5	805	95	22
662	95	22	734	73	6	806	95	21
663	95	19	735	49	5	807	95	19
664	95	18	736	50	77	808	94	20
665	95	20	737	95	39	809	94	22
666	94	60	738	95	30	810	94	22
667	95	48	739	95	28	811	94	22
668	95	39	740	94	31	812	95	23
669	95	36	741	95	36	813	94	22
670	95	27	742	95	36	814	95	22
671	95	22	743	95	30	815	95	19
672	95	19	744	95	26	816	95	16

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
817	95	14	889	95	19	961	98	19
818	95	18	890	94	18	962	98	14
819	95	18	891	94	20	963	98	11
820	94	20	892	94	26	964	98	9
821	94	22	893	95	29	965	98	7
822	94	19	894	94	32	966	98	7
823	95	18	895	95	26	967	98	6
824	95	17	896	95	34	968	98	6
825	95	19	897	95	30	969	98	6
826	95	19	898	95	24	970	98	5
827	95	19	899	95	19	971	98	5
828	94	19	900	94	17	972	82	5
829	94	21	901	94	16	973	49	5
830	94	19	902	98	19	974	51	6
831	94	17	903	98	17	975	51	6
832	94	18	904	98	12	976	51	6
833	94	21	905	98	10	977	51	5
834	94	19	906	98	8	978	51	6
835	95	18	907	98	7	979	72	58
836	95	19	908	98	6	980	94	36
837	95	17	909	98	6	981	95	28
838	94	15	910	98	6	982	95	24
839	94	17	911	98	5	983	95	25
840	95	19	912	98	5	984	95	26
841	94	22	913	98	5	985	94	30
842	94	21	914	69	5	986	94	26
843	94	18	915	49	5	987	95	34
844	94	16	916	51	5	988	95	57
845	95	14	917	51	6	989	95	45
846	95	14	918	51	6	990	94	37
847	94	19	919	69	75	991	95	34
848	95	20	920	95	70	992	95	27
849	95	23	921	95	57	993	95	27
850	98	23	922	94	49	994	95	29
851	98	22	923	94	38	995	98	22
852	98	16	924	95	43	996	94	84
853	98	12	925	94	51	997	94	74
854	98	9	926	94	41	998	95	62
855	98	8	927	98	42	999	94	51
856	98	7	928	95	89	1000	95	50
857	98	6	929	95	66	1001	95	81
858	98	6	930	94	52	1002	94	65
859	98	6	931	95	41	1003	95	49
860	98	5	932	95	34	1004	94	56
861	98	5	933	95	34	1005	95	65
862	80	5	934	94	30	1006	94	59
863	49	5	935	94	30	1007	99	58
864	51	5	936	95	29	1008	98	41
865	51	5	937	94	28	1009	98	27
866	51	6	938	95	24	1010	98	19
867	51	6	939	94	34	1011	98	13
868	51	6	940	95	26	1012	98	11
869	51	6	941	94	36	1013	98	9
870	51	5	942	95	27	1014	98	8
871	51	6	943	95	25	1015	98	7
872	51	7	944	95	26	1016	98	6
873	96	45	945	94	21	1017	98	6
874	94	44	946	94	19	1018	98	6
875	94	34	947	98	21	1019	71	6
876	94	41	948	93	53	1020	49	5
877	95	44	949	94	45	1021	51	6
878	94	32	950	94	35	1022	51	6
879	95	26	951	95	28	1023	51	6
880	94	20	952	95	23	1024	51	6
881	95	29	953	95	20	1025	51	6
882	95	27	954	95	17	1026	51	6
883	95	21	955	94	19	1027	51	6
884	95	34	956	94	18	1028	51	6
885	95	31	957	94	18	1029	51	6
886	94	26	958	94	18	1030	51	6
887	95	22	959	94	19	1031	51	5
888	95	23	960	97	17	1032	51	6

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
1033	51	5	1105	95	32	1177	95	30
1034	51	6	1106	94	29	1178	95	23
1035	51	6	1107	94	26	1179	94	19
1036	51	6	1108	94	26	1180	95	25
1037	51	5	1109	94	24	1181	94	29
1038	51	5	1110	98	52	1182	98	27
1039	51	6	1111	94	41	1183	95	89
1040	51	6	1112	99	35	1184	95	74
1041	69	59	1113	95	58	1185	94	60
1042	94	48	1114	95	58	1186	94	48
1043	95	34	1115	98	57	1187	94	41
1044	95	29	1116	98	38	1188	94	29
1045	95	26	1117	98	26	1189	94	24
1046	94	27	1118	93	63	1190	95	19
1047	95	31	1119	94	59	1191	94	21
1048	95	26	1120	98	100	1192	95	29
1049	95	34	1121	94	73	1193	95	28
1050	95	29	1122	98	53	1194	95	27
1051	95	31	1123	94	76	1195	94	23
1052	95	29	1124	95	61	1196	95	25
1053	95	35	1125	94	49	1197	95	26
1054	95	38	1126	94	37	1198	94	22
1055	94	41	1127	97	50	1199	95	19
1056	95	28	1128	98	36	1200	94	17
1057	95	36	1129	98	25			
1058	94	30	1130	98	18			
1059	94	26	1131	98	12			
1060	94	33	1132	98	10			
1061	95	34	1133	98	8			
1062	95	27	1134	98	7			
1063	98	26	1135	98	7			
1064	98	19	1136	98	6			
1065	98	13	1137	98	6			
1066	98	11	1138	98	6			
1067	98	9	1139	80	6			
1068	98	7	1140	49	6			
1069	98	7	1141	78	61			
1070	98	6	1142	95	50			
1071	98	6	1143	94	43	0	0	0
1072	98	6	1144	94	42	1	0	0
1073	98	5	1145	94	31	2	0	0
1074	89	6	1146	95	30	3	0	0
1075	49	5	1147	95	34	4	0	0
1076	51	6	1148	95	28	5	0	0
1077	51	6	1149	95	27	6	0	0
1078	51	6	1150	94	27	7	0	0
1079	51	6	1151	95	31	8	0	0
1080	51	6	1152	95	42	9	1	8
1081	51	6	1153	94	41	10	6	54
1082	51	6	1154	95	37	11	8	61
1083	50	6	1155	95	43	12	34	59
1084	51	6	1156	95	34	13	22	46
1085	51	6	1157	95	31	14	5	51
1086	51	6	1158	95	27	15	18	51
1087	51	6	1159	95	23	16	31	50
1088	51	6	1160	95	27	17	30	56
1089	51	6	1161	96	38	18	31	49
1090	51	6	1162	95	40	19	25	66
1091	56	74	1163	95	39	20	58	55
1092	95	56	1164	95	26	21	43	31
1093	94	49	1165	95	33	22	16	45
1094	95	47	1166	94	28	23	24	38
1095	94	43	1167	94	34	24	24	27
1096	94	33	1168	98	73	25	30	33
1097	95	50	1169	95	49	26	45	65
1098	94	40	1170	95	51	27	50	49
1099	95	33	1171	94	55	28	23	42
1100	95	24	1172	95	48	29	13	42
1101	94	22	1173	95	35	30	9	45
1102	94	22	1174	95	39	31	23	30
1103	94	25	1175	95	39	32	37	45
1104	95	27	1176	94	41	33	44	50

Appendix II to Part 1048—Transient Duty Cycle for Engines That Are Not Constant-Speed Engines

The following table shows the transient duty-cycle for engines that are not constant-speed engines, as described in § 1048.510:

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
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

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
34	49	52	106	10	42	178	86	80
35	55	49	107	18	27	179	96	75
36	61	46	108	3	50	180	89	27
37	66	38	109	11	41	181	66	17
38	42	33	110	34	29	182	50	18
39	17	41	111	51	57	183	36	25
40	17	37	112	67	63	184	36	24
41	7	50	113	61	32	185	38	40
42	20	32	114	44	31	186	40	50
43	5	55	115	48	54	187	27	48
44	30	42	116	69	65	188	19	48
45	44	53	117	85	65	189	23	50
46	45	56	118	81	29	190	19	45
47	41	52	119	74	21	191	6	51
48	24	41	120	62	23	192	24	48
49	15	40	121	76	58	193	49	67
50	11	44	122	96	75	194	47	49
51	32	31	123	100	77	195	22	44
52	38	54	124	100	27	196	25	40
53	38	47	125	100	79	197	38	54
54	9	55	126	100	79	198	43	55
55	10	50	127	100	81	199	40	52
56	33	55	128	100	57	200	14	49
57	48	56	129	99	52	201	11	45
58	49	47	130	81	35	202	7	48
59	33	44	131	69	29	203	26	41
60	52	43	132	47	22	204	41	59
61	55	43	133	34	28	205	53	60
62	59	38	134	27	37	206	44	54
63	44	28	135	83	60	207	22	40
64	24	37	136	100	74	208	24	41
65	12	44	137	100	7	209	32	53
66	9	47	138	100	2	210	44	74
67	12	52	139	70	18	211	57	25
68	34	21	140	23	39	212	22	49
69	29	44	141	5	54	213	29	45
70	44	54	142	11	40	214	19	37
71	54	62	143	11	34	215	14	43
72	62	57	144	11	41	216	36	40
73	72	56	145	19	25	217	43	63
74	88	71	146	16	32	218	42	49
75	100	69	147	20	31	219	15	50
76	100	34	148	21	38	220	19	44
77	100	42	149	21	42	221	47	59
78	100	54	150	9	51	222	67	80
79	100	58	151	4	49	223	76	74
80	100	38	152	2	51	224	87	66
81	83	17	153	1	58	225	98	61
82	61	15	154	21	57	226	100	38
83	43	22	155	29	47	227	97	27
84	24	35	156	33	45	228	100	53
85	16	39	157	16	49	229	100	72
86	15	45	158	38	45	230	100	49
87	32	34	159	37	43	231	100	4
88	14	42	160	35	42	232	100	13
89	8	48	161	39	43	233	87	15
90	5	51	162	51	49	234	53	26
91	10	41	163	59	55	235	33	27
92	12	37	164	65	54	236	39	19
93	4	47	165	76	62	237	51	33
94	3	49	166	84	59	238	67	54
95	3	50	167	83	29	239	83	60
96	4	49	168	67	35	240	95	52
97	4	48	169	84	54	241	100	50
98	8	43	170	90	58	242	100	36
99	2	51	171	93	43	243	100	25
100	5	46	172	90	29	244	85	16
101	8	41	173	66	19	245	62	16
102	4	47	174	52	16	246	40	26
103	3	49	175	49	17	247	56	39
104	6	45	176	56	38	248	81	75
105	3	48	177	73	71	249	98	86

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
250	100	76	322	40	52	394	62	4
251	100	51	323	50	50	395	40	6
252	100	78	324	11	53	396	49	10
253	100	83	325	12	45	397	36	5
254	100	100	326	5	50	398	27	4
255	100	66	327	1	55	399	29	3
256	100	85	328	7	55	400	22	2
257	100	72	329	62	60	401	13	3
258	100	45	330	80	28	402	37	36
259	98	58	331	23	37	403	90	26
260	60	30	332	39	58	404	41	2
261	43	32	333	47	24	405	25	2
262	71	36	334	59	51	406	29	2
263	44	32	335	58	68	407	38	7
264	24	38	336	36	52	408	50	13
265	42	17	337	18	42	409	55	10
266	22	51	338	36	52	410	29	3
267	13	53	339	59	73	411	24	7
268	23	45	340	72	85	412	51	16
269	29	50	341	85	92	413	62	15
270	28	42	342	99	90	414	72	35
271	21	55	343	100	72	415	91	74
272	34	57	344	100	18	416	100	73
273	44	47	345	100	76	417	100	8
274	19	46	346	100	64	418	98	11
275	13	44	347	100	87	419	100	59
276	25	36	348	100	97	420	100	98
277	43	51	349	100	84	421	100	99
278	55	73	350	100	100	422	100	75
279	68	72	351	100	91	423	100	95
280	76	63	352	100	83	424	100	100
281	80	45	353	100	93	425	100	97
282	83	40	354	100	100	426	100	90
283	78	26	355	94	43	427	100	86
284	60	20	356	72	10	428	100	82
285	47	19	357	77	3	429	97	43
286	52	25	358	48	2	430	70	16
287	36	30	359	29	5	431	50	20
288	40	26	360	59	19	432	42	33
289	45	34	361	63	5	433	89	64
290	47	35	362	35	2	434	89	77
291	42	28	363	24	3	435	99	95
292	46	38	364	28	2	436	100	41
293	48	44	365	36	16	437	77	12
294	68	61	366	54	23	438	29	37
295	70	47	367	60	10	439	16	41
296	48	28	368	33	1	440	16	38
297	42	22	369	23	0	441	15	36
298	31	29	370	16	0	442	18	44
299	22	35	371	11	0	443	4	55
300	28	28	372	20	0	444	24	26
301	46	46	373	25	2	445	26	35
302	62	69	374	40	3	446	15	45
303	76	81	375	33	4	447	21	39
304	88	85	376	34	5	448	29	52
305	98	81	377	46	7	449	26	46
306	100	74	378	57	10	450	27	50
307	100	13	379	66	11	451	13	43
308	100	11	380	75	14	452	25	36
309	100	17	381	79	11	453	37	57
310	99	3	382	80	16	454	29	46
311	80	7	383	92	21	455	17	39
312	62	11	384	99	16	456	13	41
313	63	11	385	83	2	457	19	38
314	64	16	386	71	2	458	28	35
315	69	43	387	69	4	459	8	51
316	81	67	388	67	4	460	14	36
317	93	74	389	74	16	461	17	47
318	100	72	390	86	25	462	34	39
319	94	27	391	97	28	463	34	57
320	73	15	392	100	15	464	11	70
321	40	33	393	83	2	465	13	51

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
466	13	68	538	54	49	610	52	80
467	38	44	539	61	50	611	52	83
468	53	67	540	64	54	612	49	57
469	29	69	541	67	54	613	48	46
470	19	65	542	68	52	614	37	36
471	52	45	543	60	53	615	25	44
472	61	79	544	52	50	616	14	53
473	29	70	545	45	49	617	13	64
474	15	53	546	38	45	618	23	56
475	15	60	547	32	45	619	21	63
476	52	40	548	26	53	620	18	67
477	50	61	549	23	56	621	20	54
478	13	74	550	30	49	622	16	67
479	46	51	551	33	55	623	26	56
480	60	73	552	35	59	624	41	65
481	33	84	553	33	65	625	28	62
482	31	63	554	30	67	626	19	60
483	41	42	555	28	59	627	33	56
484	26	69	556	25	58	628	37	70
485	23	65	557	23	56	629	24	79
486	48	49	558	22	57	630	28	57
487	28	57	559	19	63	631	40	57
488	16	67	560	14	63	632	40	58
489	39	48	561	31	61	633	28	44
490	47	73	562	35	62	634	25	41
491	35	87	563	21	80	635	29	53
492	26	73	564	28	65	636	31	55
493	30	61	565	7	74	637	26	64
494	34	49	566	23	54	638	20	50
495	35	66	567	38	54	639	16	53
496	56	47	568	14	78	640	11	54
497	49	64	569	38	58	641	13	53
498	59	64	570	52	75	642	23	50
499	42	69	571	59	81	643	32	59
500	6	77	572	66	69	644	36	63
501	5	59	573	54	44	645	33	59
502	17	59	574	48	34	646	24	52
503	45	53	575	44	33	647	20	52
504	21	62	576	40	40	648	22	55
505	31	60	577	28	58	649	30	53
506	53	68	578	27	63	650	37	59
507	48	79	579	35	45	651	41	58
508	45	61	580	20	66	652	36	54
509	51	47	581	15	60	653	29	49
510	41	48	582	10	52	654	24	53
511	26	58	583	22	56	655	14	57
512	21	62	584	30	62	656	10	54
513	50	52	585	21	67	657	9	55
514	39	65	586	29	53	658	10	57
515	23	65	587	41	56	659	13	55
516	42	62	588	15	67	660	15	64
517	57	80	589	24	56	661	31	57
518	66	81	590	42	69	662	19	69
519	64	62	591	39	83	663	14	59
520	45	42	592	40	73	664	33	57
521	33	42	593	35	67	665	41	65
522	27	57	594	32	61	666	39	64
523	31	59	595	30	65	667	39	59
524	41	53	596	30	72	668	39	51
525	45	72	597	48	51	669	28	41
526	48	73	598	66	58	670	19	49
527	46	90	599	62	71	671	27	54
528	56	76	600	36	63	672	37	63
529	64	76	601	17	59	673	32	74
530	69	64	602	16	50	674	16	70
531	72	59	603	16	62	675	12	67
532	73	58	604	34	48	676	13	60
533	71	56	605	51	66	677	17	56
534	66	48	606	35	74	678	15	62
535	61	50	607	15	56	679	25	47
536	55	56	608	19	54	680	27	64
537	52	52	609	43	65	681	14	71

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
682	5	65	754	6	70	826	39	35
683	6	57	755	12	55	827	30	34
684	6	57	756	24	50	828	33	46
685	15	52	757	28	60	829	44	56
686	22	61	758	28	64	830	50	56
687	14	77	759	23	60	831	44	52
688	12	67	760	20	56	832	38	46
689	12	62	761	26	50	833	33	44
690	14	59	762	28	55	834	29	45
691	15	58	763	18	56	835	24	46
692	18	55	764	15	52	836	18	52
693	22	53	765	11	59	837	9	55
694	19	69	766	16	59	838	10	54
695	14	67	767	34	54	839	20	53
696	9	63	768	16	82	840	27	58
697	8	56	769	15	64	841	29	59
698	17	49	770	36	53	842	30	62
699	25	55	771	45	64	843	30	65
700	14	70	772	41	59	844	27	66
701	12	60	773	34	50	845	32	58
702	22	57	774	27	45	846	40	56
703	27	67	775	22	52	847	41	57
704	29	68	776	18	55	848	18	73
705	34	62	777	26	54	849	15	55
706	35	61	778	39	62	850	18	50
707	28	78	779	37	71	851	17	52
708	11	71	780	32	58	852	20	49
709	4	58	781	24	48	853	16	62
710	5	58	782	14	59	854	4	67
711	10	56	783	7	59	855	2	64
712	20	63	784	7	55	856	7	54
713	13	76	785	18	49	857	10	50
714	11	65	786	40	62	858	9	57
715	9	60	787	44	73	859	5	62
716	7	55	788	41	68	860	12	51
717	8	53	789	35	48	861	14	65
718	10	60	790	29	54	862	9	64
719	28	53	791	22	69	863	31	50
720	12	73	792	46	53	864	30	78
721	4	64	793	59	71	865	21	65
722	4	61	794	69	68	866	14	51
723	4	61	795	75	47	867	10	55
724	10	56	796	62	32	868	6	59
725	8	61	797	48	35	869	7	59
726	20	56	798	27	59	870	19	54
727	32	62	799	13	58	871	23	61
728	33	66	800	14	54	872	24	62
729	34	73	801	21	53	873	34	61
730	31	61	802	23	56	874	51	67
731	33	55	803	23	57	875	60	66
732	33	60	804	23	65	876	58	55
733	31	59	805	13	65	877	60	52
734	29	58	806	9	64	878	64	55
735	31	53	807	27	56	879	68	51
736	33	51	808	26	78	880	63	54
737	33	48	809	40	61	881	64	50
738	27	44	810	35	76	882	68	58
739	21	52	811	28	66	883	73	47
740	13	57	812	23	57	884	63	40
741	12	56	813	16	50	885	50	38
742	10	64	814	11	53	886	29	61
743	22	47	815	9	57	887	14	61
744	15	74	816	9	62	888	14	53
745	8	66	817	27	57	889	42	6
746	34	47	818	42	69	890	58	6
747	18	71	819	47	75	891	58	6
748	9	57	820	53	67	892	77	39
749	11	55	821	61	62	893	93	56
750	12	57	822	63	53	894	93	44
751	10	61	823	60	54	895	93	37
752	16	53	824	56	44	896	93	31
753	12	75	825	49	39	897	93	25

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
898	93	26	970	89	6	1042	93	17
899	93	27	971	68	6	1043	93	16
900	93	25	972	57	6	1044	93	16
901	93	21	973	66	32	1045	93	15
902	93	22	974	84	52	1046	93	16
903	93	24	975	93	46	1047	93	18
904	93	23	976	93	42	1048	93	37
905	93	27	977	93	36	1049	93	48
906	93	34	978	93	28	1050	93	38
907	93	32	979	93	23	1051	93	31
908	93	26	980	93	19	1052	93	26
909	93	31	981	93	16	1053	93	21
910	93	34	982	93	15	1054	93	18
911	93	31	983	93	16	1055	93	16
912	93	33	984	93	15	1056	93	17
913	93	36	985	93	14	1057	93	18
914	93	37	986	93	15	1058	93	19
915	93	34	987	93	16	1059	93	21
916	93	30	988	94	15	1060	93	20
917	93	32	989	93	32	1061	93	18
918	93	35	990	93	45	1062	93	17
919	93	35	991	93	43	1063	93	17
920	93	32	992	93	37	1064	93	18
921	93	28	993	93	29	1065	93	18
922	93	23	994	93	23	1066	93	18
923	94	18	995	93	20	1067	93	19
924	95	18	996	93	18	1068	93	18
925	96	17	997	93	16	1069	93	18
926	95	13	998	93	17	1070	93	20
927	96	10	999	93	16	1071	93	23
928	95	9	1000	93	15	1072	93	25
929	95	7	1001	93	15	1073	93	25
930	95	7	1002	93	15	1074	93	24
931	96	7	1003	93	14	1075	93	24
932	96	6	1004	93	15	1076	93	22
933	96	6	1005	93	15	1077	93	22
934	95	6	1006	93	14	1078	93	22
935	90	6	1007	93	13	1079	93	19
936	69	43	1008	93	14	1080	93	16
937	76	62	1009	93	14	1081	95	17
938	93	47	1010	93	15	1082	95	37
939	93	39	1011	93	16	1083	93	43
940	93	35	1012	93	17	1084	93	32
941	93	34	1013	93	20	1085	93	27
942	93	36	1014	93	22	1086	93	26
943	93	39	1015	93	20	1087	93	24
944	93	34	1016	93	19	1088	93	22
945	93	26	1017	93	20	1089	93	22
946	93	23	1018	93	19	1090	93	22
947	93	24	1019	93	19	1091	93	23
948	93	24	1020	93	20	1092	93	22
949	93	22	1021	93	32	1093	93	22
950	93	19	1022	93	37	1094	93	23
951	93	17	1023	93	28	1095	93	23
952	93	19	1024	93	26	1096	93	23
953	93	22	1025	93	24	1097	93	22
954	93	24	1026	93	22	1098	93	23
955	93	23	1027	93	22	1099	93	23
956	93	20	1028	93	21	1100	93	23
957	93	20	1029	93	20	1101	93	25
958	94	19	1030	93	20	1102	93	27
959	95	19	1031	93	20	1103	93	26
960	95	17	1032	93	20	1104	93	25
961	96	13	1033	93	19	1105	93	27
962	95	10	1034	93	18	1106	93	27
963	96	9	1035	93	20	1107	93	27
964	95	7	1036	93	20	1108	93	24
965	95	7	1037	93	20	1109	93	20
966	95	7	1038	93	20	1110	93	18
967	95	6	1039	93	19	1111	93	17
968	96	6	1040	93	18	1112	93	17
969	96	6	1041	93	18	1113	93	18

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	Time(s)	Normalized speed (in percent)	Normalized torque (in percent)	
1114	93	18	1186	93	54	1051.210 May I get preliminary approval before I complete my application?
1115	93	18	1187	93	38	1051.215 What happens after I complete my application?
1116	93	19	1188	93	30	1051.220 How do I amend the maintenance instructions in my application?
1117	93	22	1189	93	24	1051.225 How do I amend my application to include new or modified vehicles?
1118	93	22	1190	93	20	1051.230 How do I select engine families?
1119	93	19	1191	95	20	1051.235 How does testing fit with my application for a certificate of conformity?
1120	93	17	1192	96	18	1051.240 How do I determine if my engine family complies with emission standards?
1121	93	17	1193	96	15	1051.245 What records must I keep and make available to EPA?
1122	93	18	1194	96	11	1051.250 When may EPA deny, revoke, or void my certificate of conformity?
1123	93	18	1195	95	9	
1124	93	19	1196	95	8	
1125	93	19	1197	96	7	
1126	93	20	1198	94	33	
1127	93	19	1199	93	46	
1128	93	20	1200	93	37	
1129	93	25	1201	16	8	
1130	93	30	1202	0	0	Subpart D—Testing Production-line Engines
1131	93	31	1203	0	0	1051.301 When must I test my production-line vehicles or engines?
1132	93	26	1204	0	0	1051.305 How must I prepare and test my production-line vehicles or engines?
1133	93	21	1205	0	0	1051.310 How must I select vehicles or engines for production-line testing?
1134	93	18	1206	0	0	1051.315 How do I know when my engine family does not comply?
1135	93	20	1207	0	0	1051.320 What happens if one of my production-line vehicles or engines fails to meet emission standards?
1136	93	25	1208	0	0	1051.325 What happens if an engine family does not comply?
1137	93	24	1209	0	0	1051.330 May I sell vehicles from an engine family with a suspended certificate of conformity?
1138	93	21				1051.335 How do I ask EPA to reinstate my suspended certificate?
1139	93	21				1051.340 When may EPA revoke my certificate under this subpart and how may I sell these vehicles again?
1140	93	22				1051.345 What production-line testing records must I send to EPA?
1141	93	22				1051.350 What records must I keep?
1142	93	28				Subpart E—Testing In-use Engines
1143	93	29				1051.401 What provisions apply for in-use testing of my vehicles or engines?
1144	93	23				Subpart F—Test Procedures
1145	93	21				1051.501 What procedures must I use to test my vehicles or engines?
1146	93	18				1051.505 What special provisions apply for testing snowmobiles?
1147	93	16				1051.520 How do I perform durability testing?
1148	93	16				Subpart G—Compliance Provisions
1149	93	16				1051.601 What compliance provisions apply to these vehicles?
1150	93	17				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 Spark-ignition (SI) program?
1151	93	17				1051.610 What are the provisions for producing recreational vehicles with engines already certified under the motor-vehicle program or the Large SI program?
1152	93	17				1051.615 What are the special provisions for certifying small recreational engines?
1153	93	17				1051.620 When may a manufacturer introduce into commerce an uncertified
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				

PART 1051—CONTROL OF EMISSIONS FROM RECREATIONAL ENGINES AND VEHICLES

Subpart A—Determining How To Follow This Part

Sec.

1051.1 Does this part apply to me?

1051.5 May I exclude any vehicles from this part's requirements?

1051.10 What main steps must I take to comply with this part?

1051.15 Do any other regulation parts affect me?

1051.20 May I certify a recreational engine instead of the vehicle?

Subpart B—Emission Standards and Related Requirements

1051.100 What exhaust emission standards must my vehicles meet?

1051.101 What are the exhaust emission standards for snowmobiles?

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

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

1051.115 What other requirements must my vehicles meet?

1051.120 What warranty requirements apply to me?

1051.125 What maintenance instructions must I give to buyers?

1051.130 What installation instructions must I give to vehicle manufacturers?

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

1051.145 What provisions apply only for a limited time?

Subpart C—Certifying Engine Families

1051.201 What are the general requirements for submitting a certification application?

1051.205 How must I prepare my application?

recreational vehicle to be used for competition?

1051.625 What special provisions apply to unique snowmobile designs?

Subpart H—Averaging, Banking, and Trading for Certification

1051.701 General provisions.

1051.705 How do I average emission levels?

1051.710 How do I generate and bank emission credits?

1051.715 How do I trade emission credits?

1051.720 How do I calculate my average emission level or emission credits?

1051.725 What information must I retain?

1051.730 What information must I report?

Subpart I—Definitions and Other Reference Information

1051.801 What definitions apply to this part?

1051.805 What symbols, acronyms, and abbreviations does this part use?

1051.810 What materials does this part reference?

1051.815 How should I request EPA to keep my information confidential?

1051.820 How do I request a public hearing?

Authority: 42 U.S.C. 7401–7671(q).

Subpart A—Determining How To Follow This Part

§ 1051.1 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 § 1051.5 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 40 CFR part 1068 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.

§ 1051.5 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 40 CFR part 1068, subpart C, 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. Excluding engines from this part's requirements does not affect other requirements that may apply to them.

§ 1051.10 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 40 CFR 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 40 CFR part 1068 describe requirements and prohibitions that apply to manufacturers, owners, operators, rebuilders, and all others. They also describe exemptions available for special circumstances.

§ 1051.15 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 of this chapter 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.

§ 1051.20 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?

Your vehicles must meet the following exhaust emission standards:

(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, as follows:

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 (c), you must meet the emission standards and all testing and reporting requirements. Table 2 follows:

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+NO_x standards. The phase-in percentages in the following 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+NO _x	CO	
			HC+NO _x
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 (c), you must meet the emission standards and all testing and reporting requirements. Table 2 follows:

TABLE 2 OF § 1051.102.—VOLUNTARY EXHAUST EMISSION STANDARDS FOR OFF-HIGHWAY MOTORCYCLES (g/km)

Model year	Emission standards	
	HC+NO _x	CO
2002 and later ..	0.8	15

(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 allterrain 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+NO_x 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.

(3) Table 1 follows:

TABLE 1 OF § 1051.103.—EXHAUST EMISSION STANDARDS FOR ATVs (g/km)

Phase	Model year	Phase-in (percent)	Emission standards		Maximum allowable family emission limits
			HC+NO _x	CO	
					HC+NO _x
Phase 1	2006	50	2.0	25.0	20.0
	2007 and 2008	100	2.0	25.0	20.0
	2009	50	2.0	25.0	20.0
Phase 2	2009	50	1.0	25.0	2.0
	2010 and later	100	1.0	25.0	2.0

(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 ATVs under this paragraph (c), you must meet the emission standards and all testing and reporting requirements. Table 2 follows:

TABLE 2 OF § 1051.103.—VOLUNTARY EXHAUST EMISSION STANDARDS FOR ATVs (g/km)

Model year	Emission standards	
	HC+NO _x	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?

Your vehicles must meet the following requirements:

(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 (b) 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 the requirements in this paragraph (d) 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 40 CFR 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.

(iii) Table 1 follows:

TABLE 1 OF § 1051.145.—OPTIONAL EXHAUST EMISSION STANDARDS FOR PHASE 1 ATVS (g/kW-hr)

Engine displacement	Model year	Phase-in (percent)	Emission standards		Maximum allowable family emission limits
			HC+NO _x	CO	
			HC+NO _x		
<225 cc	2006	50	16.1	400	32.2
	2007 and 2008	100	16.1	400	32.2
	2009	50	16.1	400	32.2
≥225 cc	2006	50	13.4	400	26.8
	2007 and 2008	100	13.4	400	26.8
	2009	50	13.4	400	26.8

(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.

(iv) Table 2 follows:

TABLE 2 OF § 1051.145.—6-MODE DUTY CYCLE FOR RECREATIONAL ENGINES

Mode No.	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 § 1068.5 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, NO_x (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 (42 U.S.C. 7401 *et seq.*)

(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 to 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) of this section.

(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?

This section describes how to test vehicles or engines in your effort to apply 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 of this part 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 § 1068.20 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 your production-line vehicles or engines using the applicable testing procedures in subpart F of this part to show you meet the emission standards in subpart B of this part.

(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, NO_x (or HC+NO_x), and CO. The required sample size is the greater of these calculated values. Use the following equation:

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

Where:

N = Required sample size for the model year.

t₉₅ = 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, t₉₅, 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		

(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 the equations in paragraph (c) of this section (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, NO_x (or HC+NO_x) 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, NO_x (or HC+NO_x), and CO emissions):

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

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 the equation in paragraph (b) of this section (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 asking us to reinstate your suspended certificate. In your report, 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, NO_x, CO, and CO₂ 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 40 CFR part 86, subpart F, to show your vehicles meet the exhaust emission standards in § 1051.102 or § 1051.103.

Measure HC, NO_x, CO, and CO₂. 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 § 1065.10 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?

Use the following special provisions 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.

(f) Table 1 follows:

TABLE 1 OF § 1051.501.—5-MODE DUTY CYCLE FOR SNOWMOBILES

Mode No.	Engine speed	Torque	Minimum time in mode (minutes)	Weighting factors
1	100	100	5.0	0.12

TABLE 1 OF § 1051.501.—5-MODE DUTY CYCLE FOR SNOWMOBILES—Continued

Mode No.	Engine speed	Torque	Minimum time in mode (minutes)	Weighting factors
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 Spark-ignition (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 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 part 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 emission 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 § 1051.730(b)(6).

§ 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.

(1) Calculate the average emission level as:

$$\text{Emission level} = \left[\sum_i (\text{FEL})_i \times (\text{UL})_i \times (\text{Production})_i \right] / \left[\sum_i (\text{Production})_i \times (\text{UL})_i \right]$$

Where:

FEL_i = The FEL to which the engine family is certified.

UL_i = The useful life of the engine family.

Production_i = The number of vehicles in the engine family.

(2) 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:

$$\text{Credit} = \left[(\text{Average standard} - \text{Emission level}) \right] \times \left[\sum_i (\text{Production})_i \times (\text{UL})_i \right]$$

(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:

$$\text{Deficit} = \left[(\text{Emission level} - \text{Average standard}) \right] \times \left[\sum_i (\text{Production})_i \times (\text{UL})_i \right]$$

§ 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 . . .
(i) 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.
(ii) You discover an error in your report that increases your credit balance.	the discovery occurs within 180 days of receipt.	restore the credits for your use.
(iii) 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.
(iv) We discover an error in your report that reduces your credit balance.	at any time after your 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. The definitions follow:

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.

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.

Good engineering judgment has the meaning we give it in § 1068.5 of this chapter.

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.

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.

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 § 1051.5 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.

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 § 1051.5, 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 § 1068.25 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 § 1051.5).

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 (NO₂). Oxides of nitrogen are expressed quantitatively as if the NO were in the form of NO₂ (assume a molecular weight for oxides of nitrogen equivalent to that of NO₂).

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

Test vehicle or engine means a vehicle or engine in a test sample.

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.

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 United States.

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.

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.
CO₂ 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.
NO_x oxides of nitrogen (NO and NO₂).
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 Office of the Federal Register, 800 N. Capitol St., NW., 7th Floor, Suite 700, Washington, DC.

(a) *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 follows:

TABLE 1 OF § 1051.810.—ASTM MATERIALS

Document No. and name	Part 1051 reference
ASTM E29–93a, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications.	1051.240, 1051.315, 1051.345, 1051.410, 1051.415.

(b) *ISO material*. [Reserved]

§ 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.
1065.1 Applicability.
1065.5 Overview of test procedures.
1065.10 Other test procedures.

1065.15 Engine testing.
1065.20 Limits for test conditions.

Subpart B—Equipment and Analyzers

1065.101 Overview. [Reserved]
1065.105 Dynamometer and engine equipment specifications.
1065.110 Exhaust gas sampling system; spark-ignition (SI) engines.
1065.115 Exhaust gas sampling system; compression-ignition (CI) engines. [Reserved]
1065.120 Analyzers (overview/general response characteristics).
1065.125 Hydrocarbon analyzers.
1065.130 NO_x analyzers.
1065.135 CO and CO₂ analyzers.
1065.140 Smoke meters. [Reserved]
1065.145 Flow meters.

Subpart C—Test Fuels and Analytical Gases

1065.201 General requirements for test fuels.
1065.205 Test fuel specifications for distillate diesel fuel. [Reserved]
1065.210 Test fuel specifications for gasoline.
1065.215 Test fuel specifications for natural gas.
1065.220 Test fuel specifications for liquefied petroleum gas.
1065.240 Lubricating oils.
1065.250 Analytical gases.

Subpart D—Analyzer and Equipment Calibrations

1065.301 Overview.
1065.305 Torque calibration.

Subpart E—Engine Preparation and Service Accumulation

1065.405 Preparing and servicing a test engine.
1065.410 Service limits for stabilized test engines.
1065.420 Durability demonstration.

Subpart F—Running an Emission Test

1065.500 Overview of the engine dynamometer test procedures.
1065.510 Engine mapping procedures.
1065.515 Transient test cycle generation.
1065.520 Engine starting, restarting, and shutdown.
1065.525 Engine dynamometer test run.
1065.530 Test cycle validation criteria.

Subpart G—Data Analysis and Calculations

1065.601 Overview.
1065.605 Required records.
1065.610 Bag sample analysis.
1065.615 Bag sample calculations.

Subpart H—Particulate Measurements [Reserved]

Subpart I—Testing With Oxygenated Fuels [Reserved]

Subpart J—Field Testing

1065.901 Applicability.
1065.905 General provisions.
1065.910 Measurement accuracy and precision.
1065.915 Equipment specifications for SI engines.

- 1065.920 Equipment setup and test run for SI engines.
 1065.925 Calculations.
 1065.930 Specifications for mass air flow sensors.
 1065.935 Specifications for THC analyzers.
 1065.940 Specifications for NO_x and air/fuel sensors.
 1065.945 Specifications for CO analyzers.
 1065.950 Specifications for speed and torque measurement.

Subpart K—Definitions and Other Reference Information

- 1065.1000 Definitions.
 1065.1005 Symbols, acronyms, and abbreviations.
 1065.1010 Reference materials.
 1065.1015 Confidential information.

Authority: 42 U.S.C. 7401–7671(q).

Subpart A—Applicability and General Provisions

§ 1065.1 Applicability.

(a) This part describes the procedures that apply to testing that we require for the following engines or for 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 40 CFR 1068.25).

§ 1065.5 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 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 . . .	This subpart describes . . .
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.

§ 1065.10 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.

§ 1065.15 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.

§ 1065.20 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 ≤ 550 ft-lbs	±2.5 ft-lbs of NIST true value.
550 < T ≤ 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 (a)(1) 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; spark-ignition (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 $113 \pm 8^{\circ}$ 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 $190 \pm 8^{\circ}$ 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 $\pm 3.4^{\circ}$ F ($\pm 1.9^{\circ}$ 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 $\pm 10^{\circ}$ F ($\pm 5.6^{\circ}$ 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 $\pm 3.4^\circ\text{F}$ (1.9°C). There is no response time requirement for a CVS equipped with a heat exchanger.

§ 1065.115 Exhaust gas sampling system; compression-ignition (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, NO_x, CO, and CO₂ 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, which is incorporated by reference (see § 1065.1010).

§ 1065.130 NO_x analyzers.

This section describes the requirements for chemiluminescent detectors (CLD).

(a) The CLD must meet the applicable accuracy and precision specifications of ISO 8178, which is incorporated by reference (see § 1065.1010).

(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 CO₂ 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, which is incorporated by reference (see § 1065.1010).

(b) The NDIR must meet the applicable quench and interference

requirements of ISO 8178, which is incorporated by reference (see § 1065.1010).

§ 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, as follows:

TABLE 1 OF § 1065.210.—GASOLINE TEST FUEL SPECIFICATIONS

Item	Procedure	Value
Distillation Range:		
1. Initial boiling point, °C	ASTM D 86-97	23.9-35.0 ²
2. 10% point, °C	ASTM D 86-97	48.9-57.2
3. 50% point, °C	ASTM D 86-97	93.3-110.0
4. 90% point, °C	ASTM D 86-97	148.9-162.8
5. End point, °C	ASTM D 86-97	212.8
Hydrocarbon composition:		
1. Olefins, volume %	ASTM D 1319-98	10 maximum.
2. Aromatics, volume %	ASTM D 1319-98	35 minimum.
3. Saturates	ASTM D 1319-98	Remainder.
Lead (organic), g/liter	ASTM D 3237	0.013 maximum.
Phosphorous, g/liter	ASTM D 3231	0.005 maximum.
Sulfur, weight %	ASTM D 1266	0.08 maximum.
Volatility (Reid Vapor Pressure), kPa	ASTM D 3231	60.0 to 63.4 ^{1 2}

¹ For testing unrelated to evaporative emissions, the specified range is 55.2 to 63.4 kPa.

² For testing at altitudes above 1219 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.

(a) Natural gas test fuel must meet the specifications in Table 1 of § 1065.215, as follows:

TABLE 1 OF § 1065.215.—NATURAL GAS TEST FUEL SPECIFICATIONS

Item	Procedure	Value (mole percent)
1. Methane	ASTM D 1945	89.0 minimum.
2. Ethane	ASTM D 1945	4.5 maximum.
3. C3 and higher	ASTM D 1945	2.3 maximum.
4. C6 and higher	ASTM D 1945	0.2 maximum.
5. Oxygen	ASTM D 1945	0.6 maximum.
6. Inert gases (sum of CO ₂ and N ₂)	ASTM D 1945	4.0 maximum.

(b) 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.

(a) Liquefied petroleum gas test fuel must meet the specifications in Table 1 of § 1065.220, as follows:

TABLE 1 OF § 1065.220.—LIQUEFIED PETROLEUM GAS TEST FUEL SPECIFICATIONS

Item	Procedure	Value
1. Propane	ASTM D 2163	85.0 vol. percent minimum.
2. Vapor pressure at 38° C	ASTM D 1267 or 2598 ¹	14 bar maximum.
3. Volatility residue (evaporated temp., 35° C)	ASTM D 1837	-38° C maximum.
4. Butanes	ASTM D 2163	5.0 vol. percent maximum.
5. Butenes	ASTM D 2163	2.0 vol. percent maximum.
6. Pentenes and heavier	ASTM D 2163	0.5 vol. percent maximum.

TABLE 1 OF § 1065.220.—LIQUEFIED PETROLEUM GAS TEST FUEL SPECIFICATIONS—Continued

Item	Procedure	Value
7. Propene	ASTM D 2163	10.0 vol. percent maximum.
8. Residual matter (residue on evap. of 100 ml oil stain observ.).	ASTM D 2158	0.05 ml maximum pass. ²
9. Corrosion, copper strip	ASTM D 1838	No. 1 maximum.
10. Sulfur	ASTM D 2784	80 ppm maximum.
11. Moisture content	ASTM D 2713	Pass.

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).

(b) 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, as follows:

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 NO₂ in purified nitrogen (the amount of NO₂ contained in this calibration gas must not exceed 5 percent of the NO content);
- (iv) Oxygen in purified nitrogen;
- (v) CO₂ 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 judgment. 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 § 1065.105(a)(2) 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 be 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 performed 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 judgment and must be spaced evenly throughout the durability period.

(2) Emission tests must be performed 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 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