

**State of California
AIR RESOURCES BOARD**

**CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES
FOR 2005 AND LATER SMALL OFF-ROAD ENGINES**

Adopted: July 26, 2004

NOTE: This document incorporates by reference 40 Code of Federal Regulations (CFR) part 90, subparts A, B, D, and E, including Appendix A and B to subpart D, and Appendix A and B to subpart E, as amended April 25, 2000, and 40 CFR Part 86, Subparts D and portions of N, as amended October 21, 1997. All language is new and set forth in standard type. Sections that have been included in their entirety are set forth with the section number and title. California provisions that replace specific federal language provisions are denoted by the words “DELETE” for the federal language and “REPLACE WITH” or “ADD” for the California language. The symbols “* * * * *” and “...” mean that the remainder of the CFR text for a specific section is not shown in these procedures but has been incorporated by reference, unchanged. CFR sections that are not listed are not part of the test procedures. If there is any conflict between the provisions of this document and the California Health and Safety Code, Division 26, or Title 13 of the California Code of Regulations, the Health and Safety Code and Title 13 apply.

Table of Contents

Subpart A – General.....	1
§ 90.1 Applicability.....	1
§ 90.2 Effective dates.....	1
§ 90.3 Definitions.....	1
§ 90.4 Treatment of confidential information.....	5
§ 90.5 Acronyms and abbreviations.....	5
§ 90.6 Table and figure numbering; position.....	6
§ 90.7 Reference materials.....	6
Subpart B – Emission Standards and Certification Provisions.....	7
§ 90.101 Applicability.....	7
§ 90.102 Definitions.....	7
§ 90.103 Exhaust emission standards.....	7
§ 90.104 Compliance with emission standards.....	8
§ 90.105 Useful life periods for Phase 2 engines.....	10
§ 90.106 Certificate of conformity.....	11
§ 90.107 Application for certification.....	12
§ 90.108 Certification.....	13
§ 90.109 Requirement of certification – closed crankcase.....	13
§ 90.110 Requirement of certification – prohibited controls.....	13
§ 90.111 Requirement of certification – prohibition of defeat devices.....	13
§ 90.112 Requirement of certification – adjustable parameters.....	13
§ 90.113 In-use testing program for Phase 1 engines.....	14
§ 90.114 Requirement of certification – engine information label.....	14
§ 90.115 Requirement of certification – supplying production engines upon request.....	14
§ 90.116 Certification procedure – determining engine displacement, engine class, and engine families.....	14
§ 90.117 Certification procedure – test engine selection.....	15
§ 90.118 Certification procedure – service accumulation and usage of deterioration factors.....	15
§ 90.119 Certification procedure – testing.....	15
§ 90.120 Certification procedure – use of special test procedures.....	16
§ 90.121 Certification procedure – recordkeeping.....	16
§ 90.122 Amending the application and certificate of conformity.....	16
§ 90.123 Denial, revocation of certificate of conformity.....	16
§ 90.124 Request for hearing.....	16
§ 90.125 Hearing procedures.....	17
§ 90.126 Right of entry and access.....	17
Subpart D – Emission Test Equipment Provisions.....	20
§ 90.301 Applicability.....	20

§ 90.302	Definitions.....	20
§ 90.303	Symbols, acronyms, abbreviations.....	20
§ 90.304	Test equipment overview.....	20
§ 90.305	Dynamometer specifications and calibration accuracy.....	20
§ 90.306	Dynamometer torque cell calibration.....	21
§ 90.307	Engine cooling system.....	21
§ 90.308	Lubricating oil and test fuels.....	21
§ 90.309	Engine intake air temperature measurement.....	22
§ 90.310	Engine intake air humidity measurement.....	22
§ 90.311	Test conditions.....	22
§ 90.312	Analytical gases.....	22
§ 90.313	Analyzers required.....	22
§ 90.314	Analyzer accuracy and specifications.....	22
§ 90.315	Analyzer initial calibration.....	22
§ 90.316	Hydrocarbon analyzer calibration.....	23
§ 90.317	Carbon monoxide analyzer calibration.....	23
§ 90.318	Oxides of nitrogen analyzer calibration.....	23
§ 90.319	NO _x converter check.....	23
§ 90.320	Carbon dioxide analyzer calibration.....	23
§ 90.321	NDIR analyzer calibration.....	23
§ 90.322	Calibration of other equipment.....	23
§ 90.323	Analyzer bench checks.....	23
§ 90.324	Analyzer leakage check.....	23
§ 90.325	Analyzer interference checks.....	23
§ 90.326	Pre- and post-test analyzer calibration.....	23
§ 90.327	Sampling system requirements.....	24
§ 90.328	Measurement equipment accuracy/calibration frequency table.....	24
§ 90.329	Catalyst thermal stress test.....	24
	APPENDIX A TO SUBPART D OF PART 90—TABLES.....	24
	APPENDIX B TO SUBPART D OF PART 90—FIGURES.....	24
	Subpart E – Gaseous Exhaust Test Procedures.....	25
§ 90.401	Applicability.....	25
§ 90.402	Definitions.....	25
§ 90.403	Symbols, acronyms, and abbreviations.....	25
§ 90.404	Test procedure overview.....	25
§ 90.405	Recorded information.....	26
§ 90.406	Engine parameters to be measured and recorded.....	26
§ 90.407	Engine inlet and exhaust systems.....	26
§ 90.408	Pre-test procedures.....	26
§ 90.409	Engine dynamometer test run.....	27
§ 90.410	Engine test cycle.....	28
§ 90.411	Post-test analyzer procedures.....	29
§ 90.412	Data logging.....	29

§ 90.413	Exhaust sample procedure—gaseous components.....	29
§ 90.414	Raw gaseous exhaust sampling and analytical system description.....	29
§ 90.415	Raw gaseous sampling procedures.	29
§ 90.416	Intake air flow measurement specifications.	29
§ 90.417	Fuel flow measurement specifications.....	29
§ 90.418	Data evaluation for gaseous emissions.	29
§ 90.419	Raw emission sampling calculations—gasoline fueled engines.....	29
§ 90.420	CVS concept of exhaust gas sampling system.	30
§ 90.421	Dilute gaseous exhaust sampling and analytical system description.....	30
§ 90.422	Background sample.....	30
§ 90.423	Exhaust gas analytical system – CVS grab sample.....	30
§ 90.424	Dilute sampling procedures – CVS calibration.	30
§ 90.425	CVS calibration frequency.	30
§ 90.426	Dilute emission sampling calculations—gasoline fueled engines.....	30
§ 90.427	Catalyst thermal stress resistance evaluation.....	30
APPENDIX A TO SUBPART E OF PART 90—TABLES		30
APPENDIX B TO SUBPART E OF PART 90—FIGURES		31

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES
FOR 2005 AND LATER SMALL OFF-ROAD ENGINES

The following provisions of Part 90, Title 40, Code of Federal Regulations, as adopted or amended by the United State Environmental Protection Agency on the date listed, are adopted and incorporated herein by this reference for 2005 model year and later small off-road engines as the California Exhaust Emission Standards and Test Procedures for 2005 and Later Small Off-Road Engines, except as altered or replaced by the provisions set forth below.

PART 90 – CONTROL OF EMISSIONS FROM NONROAD SPARK-IGNITION ENGINES

SOURCE: 65 FR 24306, April 25, 2000, unless otherwise noted.

Subpart A – General

§ 90.1 Applicability.

DELETE,
REPLACE WITH:

(a) These provisions apply to 2005 and later model year spark-ignition small off-road engines, and any equipment that use such engines. These provisions do not apply to all engines and equipment that fall within the scope of the preemption of Section 209(e)(1)(A) of the Federal Clean Air Act, as amended, and as defined by regulation of the Environmental Protection Agency.

(b) Every new small off-road engine that is manufactured for sale, sold, offered for sale, introduced or delivered or imported into California for introduction into commerce and that is subject to any of the standards prescribed herein is required to be covered by an Executive Order issued pursuant to Article 1, Chapter 9, Title 13, California Code of Regulations.

(c) These provisions may apply to zero-emission small off-road equipment.

§ 90.2 Effective dates.

DELETE,
REPLACE WITH:

This subpart applies to small off-road engines at or below 19 kW.

§ 90.3 Definitions.

* * * * *

ADD:

The definitions in Section 2401, Chapter 9, Title 13 of the California Code of Regulations apply with the following additions:

Act DELETE.

* * * * *

Administrator DELETE,
REPLACE WITH:

Administrator means the Executive Officer of the Air Resources Board or a designee of the Executive Officer.

* * * * *

ADD:

Certificate of Conformity means an Executive Order issued in accordance with the California Health and Safety Code, Division 26, Part 5.

Certification DELETE,
REPLACE WITH:

Certification means, with respect to new small off-road engines, obtaining an executive order for an engine family complying with the small off-road engine emission standards and requirements specified in the California Code of Regulations, Title 13, Chapter 9, Sections 2400-2409.

* * * * *

ADD:

Clean Air Act or the *Act* means California Health and Safety Code, Division 26, and corresponding regulations, except where the context indicates otherwise.

ADD:

Displacement class or *Class*, see Section 90.116(a).

* * * * *

Eligible production or U.S. production DELETE.

* * * * *

ADD:

EPA means Air Resources Board.

EPA enforcement officer DELETE,
REPLACE WITH:

EPA enforcement officer means an “ARB enforcement officer,” which means any employee of the Air Resources Board so designated in writing by the Executive Officer’s designee.

ADD:

Executive Order means an order issued by the Executive Officer of the Air Resources Board certifying engines for sale in California.

* * * * *

Handheld equipment engine DELETE.

ADD:

Hang-up means the situation whereby hydrocarbon molecules are absorbed, condensed, or otherwise removed from the sample flow prior to the instrument detector; and any subsequent desorption of the molecules into the sample flow when such molecules are assumed to be absent.

* * * * *

Nonroad engine DELETE,
REPLACE WITH:

Nonroad engine means an off-road engine as defined in this section.

Nonroad vehicle DELETE,
REPLACE WITH:

Nonroad vehicle means a vehicle that is powered by an off-road engine as defined in this section and that is not a motor vehicle or a vehicle used solely for competition. Nonroad vehicle also includes equipment powered by off-road engines.

* * * * *

ADD:

Off-road engine means:

(1) Except as discussed in paragraph (2) of this definition, any internal combustion engine:

(i) In or on a piece of equipment that is self-propelled or serves a dual purpose by both propelling itself and performing another function (such as garden tractors, off-highway

mobile cranes, and bulldozers); or

(ii) In or on a piece of equipment that is intended to be propelled while performing its function (such as lawnmowers and string trimmers); or

(iii) That, by itself or in or on a piece of equipment, is portable or transportable, meaning designed to be and capable of being carried or moved from one location to another. Indicia of transportability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform.

(2) An internal combustion engine is not an off-road engine if:

(i) The engine is used to propel a vehicle subject to the emissions standards contained in Title 13, California Code of Regulations, Sections 1950-1978, or a vehicle used solely for competition, or is subject to standards promulgated under section 202 of the federal Clean Air Act (42 U.S.C); or

(ii) The engine is regulated by a federal New Source Performance Standard promulgated under section 111 of the 1990 Clean Air Act (42 U.S.C. 7511); or

(iii) The engine otherwise included in paragraph (1)(iii) of this definition remains or will remain at a location for more than 12 consecutive months or a shorter period of time for an engine located at a seasonal source. A location is any site at a building, structure, facility, or installation. Any engine (or engines) that replaces an engine at a location and that is intended to perform the same or similar function as the engine replaced will be included in calculating the consecutive time period. An engine located at a seasonal source is an engine that remains at a seasonal source during the full annual operating period of the seasonal source. A seasonal source is a stationary source that remains in a single location on a permanent basis (i.e., at least two years) and that operates at that single location approximately three months (or more) each year. This paragraph does not apply to an engine after the engine is removed from the location.

ADD:

Oxides of nitrogen means the sum of the nitric oxide and nitrogen dioxide contained in a gas sample as if the nitric oxide were in the form of nitrogen dioxide.

Phase 1 engine DELETE.

Phase 2 engine DELETE,
REPLACE WITH:

Phase 2 engine means any small off-road engine subject to the 2005 or later emission standards listed in Title 13, California Code of Regulations, Section 2403.

* * * * *

Small volume engine family DELETE.

Small volume engine manufacturer DELETE,
REPLACE WITH:

Small volume engine manufacturer means any engine manufacturer whose total eligible

California production of small off-road engines are projected at the time of certification of a given model year to be no more than 500 engines.

Small volume equipment manufacturer DELETE.

Small volume equipment model DELETE.

* * * * *

§ 90.4 Treatment of confidential information.

DELETE,
REPLACE WITH:

Any manufacturer may assert that some or all of the information submitted pursuant to Title 13, California Code of Regulations, Division 3, Chapter 9, Article 1 (Small Off-Road Engines) is entitled to confidential treatment as provided by Title 17, California Code of Regulations, Sections 91000-91022.

§ 90.5 Acronyms and abbreviations.

* * * * *

ADD:
C – Celsius
cc – Cubic centimeter(s)

* * * * *

ADD:
cm – Centimeter(s)

* * * * *

ADD:
EGR – Exhaust gas recirculation

* * * * *

ADD:
hr – hour

* * * * *

ADD:

in. – inch(es)
K – Kelvin
kg – Kilogram(s)
kPa – Kilopascals
kW – Kilowatt
lb – Pound(s)
m – Meter(s)

* * * * *

ADD:
N – Newton

* * * * *

ADD:
No. – Number

* * * * *

ADD:
PM – Particulate

* * * * *

ADD:
ppm – parts per million by volume
psi – Pounds per square inch
RPM – Revolutions per minute

* * * * *

ADD:
° – Degree(s)
% – Percent

§ 90.6 Table and figure numbering; position.

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§ 90.7 Reference materials.

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Subpart B – Emission Standards and Certification Provisions

§ 90.101 Applicability.

* * * * *

§ 90.102 Definitions.

* * * * *

§ 90.103 Exhaust emission standards.

(a) DELETE,
REPLACE WITH:

(a) (1) Exhaust emissions from small off-road spark-ignition engines manufactured for sale, sold, offered for sale in California, or that are introduced, delivered or imported into California for introduction into commerce, must not exceed:

Exhaust Emission Standards for Spark-Ignition Engines
(grams per kilowatt-hour)

Model Year	Displacement Category	Durability Periods (hours)	Hydrocarbon plus Oxides of Nitrogen ⁽¹⁾⁽³⁾	Carbon Monoxide	Particulate
2005 and subsequent	<50 cc	50/125/300	50	536	2.0 ⁽²⁾
	50-80 cc, inclusive	50/125/300	72	536	2.0 ⁽²⁾
2005	>80 cc - <225 cc Horizontal-shaft Engine	125/250/500	16.1	549	
	>80 cc - <225 cc Vertical-shaft Engine	NA	16.1	467	
	≥225 cc	125/250/500	12.1	549	
2006	>80 cc - <225 cc	125/250/500	16.1	549	
	≥ 225 cc	125/250/500	12.1	549	
2007	>80 cc - <225 cc	125/250/500	10.0	549	
	≥ 225 cc	125/250/500	12.1	549	
2008 and subsequent	>80 cc - <225 cc	125/250/500	10.0	549	
	≥ 225 cc	125/250/500/1000	8.0	549	

(1) The Executive Officer may allow gaseous-fueled (i.e., propane, natural gas) engine families, that satisfy the requirements of the regulations, to certify to either the hydrocarbon plus oxides of nitrogen or hydrocarbon emission standard, as applicable, on the basis of the non-methane hydrocarbon (NMHC) portion of the total hydrocarbon emissions.

(2) Applicable to all two-stroke engines.

(3) Engines used exclusively to power products which are used exclusively in wintertime, at the option of the engine manufacturer, may comply with the provisions in section 90.103(a)(2)(ii).

(2) (i) Two-stroke engines used to power snowthrowers may meet the emission

standards for engines at or less than 80 cc in displacement.

(ii) Engines used exclusively to power products which are used exclusively in wintertime, such as snowthrowers and ice augers, at the option of the engine manufacturer, need not certify to or comply with standards regulating emissions of HC+NO_x or NMHC+NO_x, as applicable. If the manufacturer exercises the option to certify to standards regulating such emissions, such engines must meet such standards. If the engine is to be used in any equipment or vehicle other than an exclusively wintertime product such as a snowthrower or ice auger, it must be certified to the applicable standard regulating emissions of HC+NO_x or NMHC+NO_x as applicable.

(3) Low-emitting Blue Sky Series engine requirements.

Voluntary standards. Engines may be designated “Blue Sky Series” engines by meeting:

- (i) All applicable requirements of this Article, and
- (ii) The following voluntary exhaust emission standards, which apply to all certification and compliance testing. Blue Sky Series engines shall not be included in the averaging, banking, and trading program. Zero-emission small off-road equipment may certify to the Blue Sky Series emission standards. Manufacturers of zero-emission small off-road equipment are not required to perform emissions testing, but must file an application of certification and comply with the administrative requirements outlined in these procedures.

Voluntary Emission Standards
(grams per kilowatt-hour)

Model Year	Displacement Category	Hydrocarbon plus Oxides of Nitrogen	Carbon Monoxide	Particulate*
2005 and subsequent	<50 cc	25	536	2.0
	50 - 80 cc, inclusive	36	536	2.0
2007 and subsequent	>80 cc - <225 cc	5.0	549	
2008 and subsequent	≥225 cc	4.0	549	

* Applicable to all two-stroke engines

* * * * *

§ 90.104 Compliance with emission standards.

* * * * *

- (a) DELETE.
- (b) DELETE.
- (c) DELETE.

* * * * *

(f) DELETE,
REPLACE WITH:

Each engine manufacturer must comply with all provisions of the averaging, banking, and trading program outlined in Title 13, California Code of Regulations, Sections 2408-2409, for each engine family participating in that program.

(g) (1) DELETE,
REPLACE WITH:

Small volume engine manufacturers may, at their option, take deterioration factors for HC+NO_x (NMHC+NO_x) and CO from Table 1 or Table 2 of this paragraph (g) or they may calculate deterioration factors for HC+NO_x (NMHC+NO_x) and CO according to the process described in paragraph (h) of this section. For technologies that are not addressed in Table 1 or Table 2 of this paragraph (g), the manufacturer may ask the Executive Officer to assign a deterioration factor prior to the time of certification.

(2) DELETE,
REPLACE WITH:

Table 1 follows:

TABLE 1: ENGINES GREATER THAN 80 CC HC+NO_x (NMHC+NO_x) AND CO ASSIGNED DETERIORATION FACTORS FOR SMALL VOLUME ENGINE MANUFACTURERS

Displacement category	Side valve engines		Overhead valve engines		Engines with aftertreatment
	HC+NO _x (NMHC+NO _x)	CO	HC+NO _x (NMHC+NO _x)	CO	
>80 cc-<225 cc	2.1	1.1	1.5	1.1	DFs must be calculated using the formula in Section 90.104(g)(4)
≥ 225 cc	1.6	1.1	1.4	1.1	

(3) DELETE,
REPLACE WITH:

Table 2 follows:

TABLE 2. ENGINES AT OR BELOW 80 CC HC+NO_x (NMHC+NO_x) AND CO ASSIGNED DETERIORATION FACTORS FOR SMALL VOLUME ENGINE MANUFACTURERS

Displacement category	Two-stroke engines ¹		Four-stroke engines		Engines with aftertreatment
	HC+NO _x (NMHC+NO _x)	CO	HC+NO _x (NMHC+NO _x)	CO	
0-80 cc, inclusive	1.1	1.1	1.5	1.1	DFs must be calculated using the formula in Section 90.104(g)(4)

¹ Two-stroke technologies to which these assigned deterioration factors apply include conventional

two-strokes, compression wave designs, and stratified scavenging designs.

* * * * *

(h) (2) DELETE,
REPLACE WITH:

For engines not using assigned deterioration factors from Table 1 or Table 2 of paragraph (g) of this section, deterioration factors shall be determined as follows:

(i) The new prototype engine must be emissions tested at break-in with all emission control systems (e.g., EGR, catalyts, etc.) installed.

(ii) The engine must be aged on the emissions durability cycle to the first test point. The manufacturer may choose its test points provided that, the points are equally divided (same number of hours \pm 2 hours). An emissions test is conducted at half the emissions durability period \pm 2 hours.

(iii) The prototype engine must be emissions tested at each test point.

Following testing the durability cycle must be continued to the next point.

(iv) Only specified maintenance may be performed during durability cycle testing.

(v) When the prototype engine has been aged on the durability cycle to the full emissions durability cycle, a final emissions test must be conducted.

(vi) For each pollutant, a line must be fitted to the data points treating the initial test as occurring at hour=0, and using the method of least-squares. The deterioration factor is the calculated emissions at the end of the emissions durability period divided by the calculated emissions at zero hours.

(vii) If the engine manufacturer conducts more than one test at a test point, the number of tests at every test point must be the same. All tests must be used in the linear regression analysis as separate points to determine the deterioration factor.

(viii) Additional engines identical to the original test engine may be tested with prior approval from the Executive Officer. In such cases, data collection must remain consistent for all test engines. The testing of multiple engines requires the determination of separate deterioration factors for each test engine. The official deterioration factor shall be the average of the separate deterioration factors for each test engine.

(ix) The product of the zero-hour (break-in) results from the engine multiplied by the deterioration factor is the emissions certification value for that engine family and pollutant. In the case of multiple zero-hour tests on a single engine, the engine manufacturer must select the last zero-hour test as the official zero-hour test upon which the deterioration factor is applied. If multiple engines are tested, the manufacturer must select the highest zero-hour result among the last zero-hour test of each engine as the official zero-hour test upon which the deterioration factor is applied.

* * * * *

§ 90.105 Useful life periods for Phase 2 engines.

* * * * *

(a) (1) DELETE,
REPLACE WITH:

For engines greater than 80 cc in displacement: Manufacturers shall select a useful life category from Table 1 of this section at the time of certification.

(2) DELETE,
REPLACE WITH:

Table 1 follows:

TABLE 1: USEFUL LIFE CATEGORIES FOR ENGINES GREATER THAN 80 CC IN DISPLACEMENT (HOURS)

Engine class	Durability Periods (hours)			
	>80 cc - <225 cc	125	250	500
≥ 225 cc	125	250	500	1000*

* Applicable to engines certifying to the 2008 and later model year emission standards, as specified in section 90.103(a)(1).

(3) DELETE,
REPLACE WITH:

For engines less than or equal to 80 cc in displacement: Manufacturers shall select a useful life category from Table 2 of this section at the time of certification.

(4) DELETE,
REPLACE WITH:

Table 2 follows:

TABLE 2: USEFUL LIFE CATEGORIES FOR ENGINES LESS THAN OR EQUAL TO 80 CC IN DISPLACEMENT (HOURS)

Engine class	Durability Periods (hours)		
	0-80 cc, inclusive	50	125	300

* * * * *

§ 90.106 Certificate of conformity.

(a) (1) DELETE,
REPLACE WITH:

Every manufacturer of a new small off-road engine must obtain an Executive Order covering the engine family. The Executive Order must be obtained from the Executive

Officer prior to selling, offering for sale, introducing into commerce, or importing into California the new small off-road engine for each model year.

(2) DELETE,
REPLACE WITH:

The Executive Officer may request notification, prior to the initial model year submission of an engine manufacturer's certification application(s), of the engine manufacturer's intent to seek engine family certification (i.e., a letter of intent) so that the Executive Officer can adequately allocate resources required for reviewing such certification applications in a timely manner. Such letters of intent must provide the engine manufacturer's best estimate of general information for the applicable model-year certification, such as identification of each engine family, date of expected submission, etc.

* * * * *

(b) (3) DELETE.

* * * * *

(e) DELETE.

* * * * *

§ 90.107 Application for certification.

* * * * *

(d) (11) (i) DELETE,
REPLACE WITH:

A statement indicating whether the manufacturer intends to include the engine family in a corporate average, and, if so, the engine family's expected Family Emission Levels and an estimate of the overall corporate average emissions for that model year.

* * * * *

ADD:

(d) (12) Projected California sales data of the engine family for which certification is requested. Such estimated sales data must include an explanation of the method used to make the estimate.

(13) For zero-emission small off-road equipment, the certification application shall include the following:

- (i) Identification and description of the equipment covered by the application.
- (ii) Identification of the power source system weight (e.g., battery weight) and gross equipment weight rating of the equipment.

(iii) Identification and description of the power source system for the equipment.

(iv) Projected California sales.

(v) All information necessary for proper and safe operation and maintenance of the equipment, including recharging information and other relevant information as determined by the Executive Officer.

(vi) A copy of the owner's manual must be submitted during certification for approval by the Executive Officer. The manual must include the information as required by subsections (i), (ii), (iii), and (v) above.

(e) DELETE.

* * * * *

(h) DELETE.

§ 90.108 Certification.

* * * * *

(c) DELETE,
REPLACE WITH:

For certificates issued for engine families included in the averaging, banking the trading program as described in Title 13, California Code of Regulations, Sections 2408-2409.

* * * * *

§ 90.109 Requirement of certification – closed crankcase.

* * * * *

§ 90.110 Requirement of certification – prohibited controls.

* * * * *

§ 90.111 Requirement of certification – prohibition of defeat devices.

* * * * *

§ 90.112 Requirement of certification – adjustable parameters.

* * * * *

(c) DELETE,

REPLACE WITH:

For engines with adjustable parameters, manufacturers must test the engines at both extremes of the adjustment, as applicable.

§ 90.113 In-use testing program for Phase 1 engines.

DELETE.

§ 90.114 Requirement of certification – engine information label.

DELETE,

REPLACE WITH:

The label shall meet the requirements specified in Section 2404, Title 13 of the California Code of Regulations.

§ 90.115 Requirement of certification – supplying production engines upon request.

* * * * *

§ 90.116 Certification procedure – determining engine displacement, engine class, and engine families.

(a) DELETE,

REPLACE WITH:

Engine displacement must be calculated using nominal engine values and rounded to the nearest whole cubic centimeter in accordance with ASTM E29-93a (May 1993). This procedure has been incorporated by reference. See section 90.7. Engines will be divided into displacement categories by the following:

- (1) Engines less than 50 cc in displacement,
- (2) Engines 50 cc and greater, but less than or equal to 80 cc in displacement,
- (3) Engines greater than 80 cc but less than 225 cc in displacement, and
- (4) Engines 225 cc in displacement and greater.

* * * * *

(d) (5) DELETE,

REPLACE WITH:

The engine displacement category. Engines of different displacements that are within fifteen percent of the largest displacement may be included within the same engine family provided the engine displacement category requirement is satisfied.

* * * * *

ADD:

(d) (11) The exhaust port(s) and cylinder design of two-stroke engines.

* * * * *

§ 90.117 Certification procedure – test engine selection.

* * * * *

ADD:

(c) Each manufacturer shall provide to the Executive Officer in the engine family certification application the reason for its test engine choice. In the event that the Executive Officer determines that the test engine configuration does not meet the requirements specified in paragraph (a), the Executive Officer will notify the manufacturer. Any disapproval must be accompanied by a statement of the reasons thereof. In the event of disapproval, the manufacturer may petition the California Air Resources Board to review the decision of the Executive Officer.

§ 90.118 Certification procedure – service accumulation and usage of deterioration factors.

* * * * *

ADD:

(f) The use of auxiliary fans for engine cooling must be indicated in the application for certification. The manufacturer must justify to the satisfaction of the Executive Officer in the application for certification the need for and use of such fans. The manufacturer must also demonstrate that the supplemental cooling resulting from the use of the fans is representative of in-use engine operation.

§ 90.119 Certification procedure – testing.

* * * * *

(a) (1) (i) DELETE,
REPLACE WITH:

Engines greater than 80 cc displacement volume must use Test Cycle A described in subpart E of this part, except that engine families in which 100 percent of the engines sold operate only at rated speed may use Test Cycle B described in Subpart E of this part.

(ii) DELETE,
REPLACE WITH:

Engines less than or equal to 80 cc displacement volume must use Test Cycle C described in subpart E of this part.

* * * * *

§ 90.120 Certification procedure – use of special test procedures.

* * * * *

§ 90.121 Certification procedure – recordkeeping.

* * * * *

(a) (2) DELETE.

* * * * *

§ 90.122 Amending the application and certificate of conformity.

* * * * *

(d) (4) DELETE,

REPLACE WITH:

If the Executive Officer determines that a revised FEL meets the requirement of this subpart, the appropriate Executive Order will be amended, or a new Executive Order will be issued to reflect the revised FEL. The Executive Order is revised conditional upon compliance with Section 2408(f)(2), Chapter 9, Title 13 of the California Code of Regulations.

* * * * *

§ 90.123 Denial, revocation of certificate of conformity.

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(b) (5) DELETE,

REPLACE WITH:

The engine manufacturer denies an ARB enforcement officer or ARB authorized representative reasonable assistance (as defined in § 90.126).

* * * * *

§ 90.124 Request for hearing.

DELETE,

REPLACE WITH:

A manufacturer may request a hearing on an Executive Officer's decision regarding

certification, as specified in Title 17, California Code of Regulations, Division 3, Chapter 1, Subchapter 1.25, Articles 1 and 2.

§ 90.125 Hearing procedures.

DELETE,
REPLACE WITH:

The hearing procedures set forth in Subchapter 1.25, Title 17, California Code of Regulations, Section 60040, et seq. apply to this subpart.

§ 90.126 Right of entry and access.

DELETE,
REPLACE WITH:

(a) Any engine manufacturer affected by these regulations, upon receipt of prior notice must admit or cause to be admitted during operating hours any ARB Enforcement Officer that has presented proper credentials to any of the following:

(1) Any facility where tests or procedures or activities connected with such tests or procedures are or were performed.

(2) Any facility where any new small off-road engine is present and is being, has been, or will be tested.

(3) Any facility where a manufacturer constructs, assembles, modifies, or builds-up an engine into a certification engine that will be tested for certification.

(4) Any facility where any record or other document relating to any of the above is located.

(b) Upon admission to any facility referred to in paragraph (c)(1) of this Section, any ARB Enforcement Officer must be allowed:

(1) To inspect and monitor any part or aspect of such procedures, activities, and testing facilities, including, but not limited to, monitoring engine preconditioning, emissions tests and break-in, maintenance, and engine storage procedures.

(2) To verify correlation or calibration of test equipment; and,

(3) To inspect and make copies of any such records, designs, or other documents; and,

(4) To inspect and/or photograph any part or aspect of any such certification engine and any components to be used in the construction thereof.

(c) To permit an ARB determination whether production small off-road engines conform in all material respects to the design specifications that apply to those engines described in the Executive Order certifying such engines and to standards prescribed herein. Engine manufacturers must, upon receipt of prior notice, admit any ARB Enforcement Officer, upon presentation of credentials, to:

(1) Any facility where any document design, or procedure relating to the translation of the design and construction of engines and emission related components described in

the application for certification or used for certification testing into production engines is located or carried on; and,

(2) Any facility where any small off-road engines to be introduced into commerce are manufactured or assembled.

(3) Any California retail outlet where any small off-road engine is sold.

(d) On admission to any such facility referred to in this Section, any ARB Enforcement Officer must be allowed:

(1) To inspect and monitor any aspects of such manufacture or assembly and other procedures;

(2) To inspect and make copies of any such records, documents or designs; and,

(3) To inspect and photograph any part or aspect of any such new small off-road engines and any component used in the assembly thereof that are reasonably related to the purpose of the Enforcement Officer's entry.

(e) Any ARB Enforcement Officer must be furnished by those in charge of a facility being inspected with such reasonable assistance as may be necessary to discharge any function listed in this paragraph. Each applicant for or recipient of certification is required to cause those in charge of a facility operated for its benefit to furnish such reasonable assistance without charge to the ARB irrespective of whether or not the applicant controls the facility.

(f) The duty to admit or cause to be admitted any ARB Enforcement Officer applies whether or not the applicant owns or controls the facility in question and applies both to domestic and foreign engine manufacturers and facilities. The ARB will not attempt to make any inspections that it has been informed that local law forbids. However, if local law makes it impossible to insure the accuracy of data generated at a facility, no informed judgment that an engine is certifiable or is covered by an Executive Order can properly be based on the data. It is the responsibility of the engine manufacturer to locate its testing and manufacturing facilities in jurisdictions where this situation will not arise.

(g) For purposes of this Section:

(1) "Presentation of credentials" means a display of a document designating a person to be an ARB Enforcement Officer.

(2) Where engine, component, or engine storage areas or facilities are concerned, "operating hours" means all times during which personnel are at work in the vicinity of the area or facility and have access to it.

(3) Where facilities or areas other than those covered by paragraph (g)(2) of this Section are concerned, "operating hours" means all times during which an assembly line is in operation or during which testing, maintenance, break-in procedure, production or compilation of records, or any other procedure or activity is being conducted related to certification testing, translation of designs from the test stage to the production stage, or engine manufacture or assembly.

(4) "Reasonable assistance" includes, but is not limited to, providing clerical, copying, interpretation and translation services; making personnel available upon request

to inform the ARB Enforcement Officer of how the facility operates and to answer questions; and performing requested emissions tests on any engine that is being, has been, or will be used for certification testing. Such tests must be nondestructive, but may require appropriate break-in. The engine manufacturer must be compelled to cause the personal appearance of any employee at such a facility before an ARB Enforcement Officer, upon written request from the Executive Officer for the appearance of any employee of a facility, and service of such request upon the engine manufacturer. Any such employee who has been instructed by the engine manufacturer to appear will be entitled to be accompanied, represented, and advised by counsel.

Subpart D – Emission Test Equipment Provisions

§ 90.301 Applicability.

* * * * *

(d) DELETE,
REPLACE WITH:

For gaseous-fueled engines greater than 80 cc displacement volume, the following sections from 40 CFR Part 86 are applicable to this subpart. The requirements of the following sections from 40 CFR Part 86 which pertain specifically to the measurement and calculation of non-methane hydrocarbon (NMHC) exhaust emissions from otto cycle heavy-duty engines must be followed when determining the NMHC exhaust emissions from gaseous-fueled engines greater than 80 cc displacement volume. Those sections are: 40 CFR 86.1306-90 Equipment required and specifications; overview, 40 CFR 86.1309-90 Exhaust gas sampling system; otto-cycle engines, 40 CFR 86.1311-94 Exhaust gas analytical system; CVS bag sampling, 40 CFR 86.1313-94(e) Fuel Specification – Natural gas-fuel, 40 CFR 86.1313-94(f) Fuel Specification – Liquefied petroleum gas-fuel, 40 CFR 86.1314-94 Analytical gases, 40 CFR 86.1316-94 Calibrations; frequency and overview, 40 CFR 86.1321-94 Hydrocarbon analyzer calibration, 40 CFR 86.1325-94 Methane analyzer calibration, 40 CFR 86.1327-94 Engine dynamometer test procedures, overview, 40 CFR 86.1340-94 Exhaust sample analysis, 40 CFR 86.1342-94 Calculations; exhaust emissions, 40 CFR 86.1344-94(d) Required information – Pre-test data, 40 CFR 86.1344-94(e) Required information – Test data.

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§ 90.302 Definitions.

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§ 90.303 Symbols, acronyms, abbreviations.

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§ 90.304 Test equipment overview.

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§ 90.305 Dynamometer specifications and calibration accuracy.

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§ 90.306 Dynamometer torque cell calibration.

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§ 90.307 Engine cooling system.

DELETE,
REPLACE WITH:

An engine cooling system is required with sufficient capacity to maintain the engine at normal operating temperatures as prescribed by the engine manufacturer. Auxiliary fan(s) may be used to maintain sufficient engine cooling during engine dynamometer operation. The use of auxiliary fans for engine cooling must be indicated in the application for certification. The manufacturer must justify to the satisfaction of the Executive Officer in the application for certification the need for and use of such fans. The manufacturer must also demonstrate that the supplemental cooling resulting from the use of the fans is representative of in-use engine operation.

§ 90.308 Lubricating oil and test fuels.

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(b) (1) DELETE,
REPLACE WITH:

(b) (1) (i) The certification test fuel used for emission testing must be consistent with the fuel specifications as outlined in the California Code of Regulations, Title 13, Section 1960.1, and the latest amendment of the “California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles”, incorporated by reference herein. The test fuel specification should remain consistent from batch to batch. If a particular engine requires a different octane (or cetane) fuel, test records should indicate the fuel used.

(ii) Alcohol-based fuels. Alcohol-based fuels must be allowed for emission test purposes when the appropriate emission standards with respect to such fuels are a part of these provisions. Such fuels must be as specified in subparagraph (b)(1)(i) above.

(c) DELETE,
REPLACE WITH:

Test fuels—service accumulation and aging.

(1) Gasoline.

(i) Unleaded gasoline representative of commercial gasoline generally available through retail outlets must be used in service accumulation and aging for gasoline-fueled spark-ignition engines. As an alternative, the certification test fuels specified under paragraph (b) of this section may be used for engine service accumulation and aging. Leaded fuel may not be used during service accumulation or aging.

(ii) The octane rating of the gasoline used must be no higher than 4.0

Research Octane Numbers above the minimum recommended by the engine manufacturer when a certification fuel is not used for service accumulation, and must have a minimum sensitivity of 7.5 Octane Numbers. Sensitivity is the Research Octane Number minus the Motor Octane Number.

(iii) The Reid Vapor Pressure of a gasoline must be characteristic of the engine fuel during the season in which the service accumulation takes place in the outdoors, or must be characteristic of the engine fuel appropriately suited to the ambient conditions of an indoor test cell in which the entire service accumulation takes place.

(2) Alternative fuels

(i) Liquefied petroleum gas meeting the ASTM D1835 (11/10/1997) or NGPA HD-5 (1970) specifications must be used for service accumulation.

(ii) Natural gas representative of commercial natural gas that is available locally to the manufacturer's test site may be used in service accumulation. The manufacturer must provide the Executive Officer with detail of how the commercial natural gas differs from the certification test fuel specifications.

§ 90.309 Engine intake air temperature measurement.

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§ 90.310 Engine intake air humidity measurement.

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§ 90.311 Test conditions.

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§ 90.312 Analytical gases.

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§ 90.313 Analyzers required.

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§ 90.314 Analyzer accuracy and specifications.

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§ 90.315 Analyzer initial calibration.

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§ 90.316 Hydrocarbon analyzer calibration.

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§ 90.317 Carbon monoxide analyzer calibration.

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§ 90.318 Oxides of nitrogen analyzer calibration.

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§ 90.319 NO_x converter check.

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§ 90.320 Carbon dioxide analyzer calibration.

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§ 90.321 NDIR analyzer calibration.

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§ 90.322 Calibration of other equipment.

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§ 90.323 Analyzer bench checks.

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§ 90.324 Analyzer leakage check.

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§ 90.325 Analyzer interference checks.

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§ 90.326 Pre- and post-test analyzer calibration.

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§ 90.327 Sampling system requirements.

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§ 90.328 Measurement equipment accuracy/calibration frequency table.

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§ 90.329 Catalyst thermal stress test.

DELETE.

APPENDIX A TO SUBPART D OF PART 90—TABLES

TABLE 1—SYMBOLS USED IN SUBPART D

* * * * *

TABLE 3—TEST FUEL SPECIFICATIONS

DELETE,
REPLACE WITH:
See section 90.308.

APPENDIX B TO SUBPART D OF PART 90—FIGURES

* * * * *

Subpart E – Gaseous Exhaust Test Procedures

§ 90.401 Applicability.

* * * * *

(c) DELETE.

(d) DELETE,
REPLACE WITH:

For gaseous-fueled engines greater than 80 cc displacement volume, the following sections from 40 CFR Part 86 are applicable to this subpart. The requirements of the following sections from 40 CFR Part 86 which pertain specifically to the measurement and calculation of non-methane hydrocarbon (NMHC) exhaust emissions from otto cycle heavy-duty engines must be followed when determining the NMHC exhaust emissions from gaseous-fueled engines greater than 80 cc displacement volume. Those sections are: 40 CFR 86.1327-94 Engine dynamometer test procedures, overview, 40 CFR 86.1340-94 Exhaust sample analysis, 40 CFR 86.1342-94 Calculations; exhaust emissions, 40 CFR 86.1344-94(d) Required information – Pre-test data, and 40 CFR 86.1344-94(e) Required information – Test data.

§ 90.402 Definitions.

* * * * *

§ 90.403 Symbols, acronyms, and abbreviations.

* * * * *

§ 90.404 Test procedure overview.

* * * * *

(b) DELETE,
REPLACE WITH:

The test is designed to determine the brake-specific emissions of hydrocarbons, carbon monoxide, carbon dioxide, and oxides of nitrogen and fuel consumption. For gaseous-fueled engines greater than 80 cc displacement volume the test is also designed to determine the brake-specific emissions of non-methane hydrocarbons. The test consists of three different test cycles which are application specific for engines which span the typical operating range of small off-road engines. Two cycles exist for engines greater than 80 cc displacement volume and one is for engines less than or equal to 80 cc displacement volume. The test cycles for engines greater than 80 cc displacement volume consist of one idle mode and five power modes at one speed (rated or intermediate). The

test cycle for engines less than or equal to 80 cc displacement volume consists of one idle mode at idle speed and one power mode at rated speed. These procedures require the determination of the concentration of each pollutant, fuel flow, and the power output during each mode. The measured values are weighted and used to calculate the grams of each pollutant emitted per brake kilowatt hour (g/kW-hr).

* * * * *

ADD:

(e) For PM testing, engine manufacturers must use the particulate sampling test procedure specified in International Organization for Standardization (ISO) test procedure 8178-1 RIC engines - Exhaust emissions measurement, Part I: Test bed measurement of gaseous and particulate exhaust emission from RIC engines, Version N124, November 11, 1992; or any similar procedure that has been approved by the Executive Officer. For two-stroke engines, engine manufacturers will be allowed, in lieu of testing, to determine PM emissions through the following equation:

$$PM_{est} = \frac{HC}{\text{Fuel to oil ratio}}$$

Where HC = weighted hydrocarbons in g/kW-hr, and
Fuel to oil ratio = the fuel to oil ratio used in the test engine.

Engine manufacturers may report this estimate as PM_{est} , and indicate that the PM emissions were estimated as per this paragraph.

§ 90.405 Recorded information.

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§ 90.406 Engine parameters to be measured and recorded.

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§ 90.407 Engine inlet and exhaust systems.

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§ 90.408 Pre-test procedures.

* * * * *

(b) (2) (i) DELETE,
REPLACE WITH:

Operate the engine on the dynamometer measuring the fuel consumption (fuel consumption required only for raw gas sampling method) and torque before and after the

emission sampling equipment is installed, including the sample probe, using the modes specified in the following table.

Engine class	Test cycle	Operating mode
(A) Engines greater than 80 cc displacement volume	A	6
(B) Engines greater than 80 cc displacement volume	B	1
(C) Engines less than or equal to 80 cc displacement volume	C	1

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§ 90.409 Engine dynamometer test run.

* * * * *

(a) (3) DELETE,
REPLACE WITH:

For engines greater than 80 cc displacement volume equipped with an engine speed governor, the governor must be used to control engine speed during all test cycle modes except for Mode 1 or Mode 6, and no external throttle control may be used that interferes with the function of the engine's governor; a controller may be used to adjust the governor setting for the desired engine speed in Modes 2-5 or Modes 7-10; and during Mode 1 or Mode 6 fixed throttle operation may be used to determine the 100 percent torque value. For vertical shaft engines greater than 80 cc but less than 225 cc displacement volume equipped with an engine speed governor, the manufacturer may carry over certification of its 2004 model year California certified engine family to the 2005 model year. The engine test results done without the use of the governor may be used for compliance. Prior written approval of the Executive Officer is required. The manufacturer must meet all other requirements for 2005 model year compliance.

* * * * *

(b) (6) DELETE,
REPLACE WITH:

For engines greater than 80 cc displacement volume, during the maximum torque mode calculate the torque corresponding to 75, 50, 25, and 10 percent of the maximum observed torque (see Table in Appendix A to this subpart).

* * * * *

(c) (6) DELETE,
REPLACE WITH:

If, during the emission measurement portion of a mode, the value of the gauges downstream of the NDIR analyzer(s) G3 or G4 (see Figure 1 in Appendix B of Subpart E),

differs by more than $\pm 0.5\text{kPa}$ from the pretest value, the test mode is void.

* * * * *

§ 90.410 Engine test cycle.

(a) DELETE,
REPLACE WITH:

Follow the appropriate 6-mode test cycle for engines greater than 80 cc displacement volume and 2-mode test cycle for engines less than or equal to 80 cc displacement volume when testing spark ignition engines (see Table 2 in Appendix A of this subpart).

(b) DELETE,
REPLACE WITH:

For engines not equipped with an engine speed governor, during each non-idle mode, hold both the specified speed and load within \pm five percent of point. During the idle mode, hold speed within \pm ten percent of the manufacturer's specified idle engine speed. For engines greater than 80 cc displacement volume equipped with an engine speed governor, during Mode 1 or Mode 6 hold both the specified speed and load within \pm five percent of point, during Modes 2-3, Modes 7-8 hold the specified load with \pm five percent of point, during Modes 4-5 or Modes 9-10, hold the specified load within the larger range provided by $\pm 0.27\text{ Nm}$ ($\pm 0.2\text{ lb-ft}$), or \pm ten (10) percent of point, and during the idle mode hold the specified speed within \pm ten percent of the manufacturer's specified idle engine speed (see Table 1 in Appendix A of this subpart for a description of test Modes). The use of alternative test procedures is allowed if approved in advance by the Executive Officer. For vertical shaft engines greater than 80 cc but less than 225 cc displacement volume equipped with an engine speed governor, the manufacturer may carry over certification of its 2004 model year California certified engine family to the 2005 model year. The engine test results done without the use of the governor may be used for compliance. Prior written approval of the Executive Officer is required. The manufacturer must meet all other requirements for 2005 model year compliance.

(c) DELETE,
REPLACE WITH:

If the operating conditions specified in paragraph (b) of this section for engines greater than 80 cc displacement volume using Mode Points 2, 3, 4, and 5 cannot be maintained, the Executive Officer may authorize deviations from the specified load conditions. Such deviations may not exceed 10 percent of the maximum torque at the test speed. The minimum deviations, above and below the specified load, necessary for stable operation shall be determined by the manufacturer and approved by the Executive Officer prior to the test run.

* * * * *

§ 90.411 Post-test analyzer procedures.

* * * * *

(a) (1) DELETE,

REPLACE WITH:

Introduce a zero gas or room air into the sample probe or valve V2 (see Figure 1 in Appendix B of Subpart E) to check the “hang-up zero” response. Simultaneously start a time measurement.

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§ 90.412 Data logging.

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§ 90.413 Exhaust sample procedure—gaseous components.

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§ 90.414 Raw gaseous exhaust sampling and analytical system description.

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§ 90.415 Raw gaseous sampling procedures.

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§ 90.416 Intake air flow measurement specifications.

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§ 90.417 Fuel flow measurement specifications.

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§ 90.418 Data evaluation for gaseous emissions.

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§ 90.419 Raw emission sampling calculations—gasoline fueled engines.

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§ 90.420 CVS concept of exhaust gas sampling system.

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§ 90.421 Dilute gaseous exhaust sampling and analytical system description.

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§ 90.422 Background sample.

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§ 90.423 Exhaust gas analytical system – CVS grab sample.

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§ 90.424 Dilute sampling procedures – CVS calibration.

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§ 90.425 CVS calibration frequency.

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§ 90.426 Dilute emission sampling calculations–gasoline fueled engines.

* * * * *

§ 90.427 Catalyst thermal stress resistance evaluation.

DELETE.

APPENDIX A TO SUBPART E OF PART 90–TABLES

TABLE 1–PARAMETERS TO BE MEASURED OR CALCULATED AND RECORDED

* * * * *

TABLE 2– DELETE,
REPLACE WITH:
SPARK-IGNITION ENGINE TEST CYCLES

Mode Speed	1	2	3	4	5	6	7	8	9	10	11
	Rated Speed					Intermediate Speed					Idle
Mode Points – A	.....	.....	.....	.....	.....	1	2	3	4	5	6

Cycle											
Load Percent – A	.....	.....	.....	.....	.....	100	75	50	25	10	0
Cycle											
Weighting (%)	.....	.....	.....	.....	.....	9	20	29	30	7	5
Mode Points – B	1	2	3	4	5	.....	.....	.....	.....	.....	6
Cycle											
Load Percent – B	100	75	50	25	10	.....	.....	.....	.....	.....	0
Cycle											
Weighting (%)	9	20	29	30	7	5
Mode Points – C	1	2
Cycle											
Load Percent – C	100	0
Cycle											
Weighting (%)	85	15

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APPENDIX B TO SUBPART E OF PART 90—FIGURES

* * * * *