Enclosure 3

Test Procedures

PROPOSED CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR NEW 2001 AND LATER OFF-ROAD LARGE SPARK-IGNITION ENGINES
PART I

PROPOSED CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR NEW 2001 AND LATER OFF-ROAD LARGE SPARK-IGNITION ENGINES
PART II

and

CALIFORNIA EXHAUST EMISSIONS STANDARDS AND TEST PROCEDURES FOR 1997 AND LATER OFF-HIGHWAY RECREATIONAL VEHICLES AND ENGINES

State of California
AIR RESOURCES BOARD

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR NEW 2001 AND LATER OFF-ROAD LARGE SPARK-IGNITION ENGINES

PART I

Adopted: _____

NOTE: The general provisions herein have been adapted and modified from similar provisions set forth in 40 CFR, Part 86, Subpart A - General Provisions for Emission Regulations for 1977 and Later Model Year New Light-Duty Vehicles, 1977 and Later Model Year New Light Duty Trucks, 1977 and Later Model Year New Heavy-Duty Engines, and for 1985 and Later Model Year New Gasoline-Fueled Heavy-Duty Vehicles.

This document is printed in a style to indicate changes from the originally proposed provisions. All originally proposed language is indicated by plain type. The suggested modifications are shown in underline to indicate additions to the original proposal and ~~strikeout~~ to indicate deletions. All proposed modifications will be made available to the public for a 15-day comment period. Only those portions containing the suggested modifications from the language contained in the original mailout, MSC 98-20, are included. All other portions remain unchanged and are indicated by the the symbol "* * * *" for reference. All proposed modifications will be made available to the public for a 15-day comment period.

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I. Emission Regulations for New 2001 and Later Off-Road Large Spark-Ignition Engines, General Provisions

1. General Applicability.

* * * *

2. Definitions.

"Accuracy" means the difference between a measurement and true value.

"Alternate Fuel" means any fuel that will reduce non-methane hydrocarbons (on a reactivity-adjusted basis), NOx, CO, and the potential risk associated with toxic air contaminants as compared to gasoline or diesel fuel and would not result in increased deterioration of the engine. Alternate fuels include, but are not limited to, methanol, ethanol, liquefied petroleum gas, compressed natural gas, and electricity.

"ARB Enforcement Officer" means any officer or employee of the Air Resources Board so designated in writing by the Executive Officer or by the Executive Officer's designee ~~(or by a designee)~~.

"Auxiliary Emission Control Device (AECD)" means any element of design which senses temperature, vehicle speed, engine RPM, transmission gear, manifold vacuum, or any other parameter for the purpose of activating, modulating, delaying, or deactivating the operation of any of the emission control system.

~~"Basic engine" means a unique combination of manufacturer, engine displacement, number of cylinders, fuel system (as distinguished by number of carburetor barrels or use of fuel injection), catalyst usage, and other engine and emission control system characteristics specified by the Executive Officer.~~

"Basic Engine" means an engine manufacturer's description of their unique combination of engine displacement, number of cylinders, fuel system, emission control system, and other engine and emission control system characteristics as determined or specified by the Executive Officer.

"Calibrating gas" means a gas of known concentration that is used to establish the response curve of an analyzer.

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

~~"Compliance testing" means ARB directed emissions tests and inspections of a reasonable number of engines and/or vehicles that are offered for sale, or manufactured for sale, in California in order to verify compliance with the applicable certification emission standards. The emissions tests may be conducted at ARB, contracted facilities, or at the manufacturer's facility. The testing will be done at the expense of the manufacturer.~~

* * * *

~~"Deterioration Factors" means the deteriorated effects of the engine, fuel system, engine sensors, exhaust aftertreatment devices, or other engine related components that contributes to the degradation of exhaust emission values from a new engine as compared to that~~

~~same engine at the end of its useful life period. Typically, the exhaust emission components are separated into separate categories of HC, CO and NOx and the deterioration factors are derived calculated based on the new engine emission values and compare to that of the engine's end of useful life period emission results.~~

"Deterioration Factor" means the calculated or assigned number that represents the certification engine's emissions change over the durability period. It is multiplied by zero hour (new) engine test results to determine the engine family compliance level. The deterioration factor is determined as per the Test Procedures. See "Emission Durability Period" below.

"Emission-related maintenance" means that maintenance that substantially affects emissions or is likely to affect the emissions deterioration of the equipment, vehicle, or engine during normal in-use operation, even if the maintenance is performed at some time other than that which is recommended.

"Emissions Durability Period" is the period over which, for purposes of certification, a manufacturer must demonstrate compliance with the standards set forth in Section 2433(b), Title 13, of the California Code of Regulations. The durability periods are also noted in the table in Section 2433 (b). The emissions durability period is used to determine an engine family's deterioration factors.

"Engine code" means a unique combination, within an engine-system combination, of displacement, air/fuel calibration, spark/timing calibration, distributor calibration, auxiliary emission control devices, and other engine and emission control system components specified by the Executive Officer.

"Engine family" ~~means the basic classification unit of a manufacturer's product line used for the purpose of test fleet selection~~ is a subclass of a basic engine based on similar emission characteristics. The engine family is the grouping of engines that is used for the purposes of certification and determined in accordance with Section 11.

* * * *

"New Engine Compliance testing" means ARB directed emissions tests and inspections of a reasonable number of production engines and/or equipment that are offered for sale, or manufactured for sale, in California in order to verify compliance with the applicable certification emission standards. The emissions tests must be conducted at a qualified testing facility. The testing facility is chosen by the manufacturer and approved by the Executive Officer. This may include ARB facilities, contracted facilities, or at the manufacturer's facility. The testing will be done at the expense of the manufacturer.

"Non-emission-related maintenance" means that maintenance that does not substantially affect emissions and that does not have a lasting effect on the emissions deterioration of the equipment, vehicle, or engine during normal in-use operation once the maintenance is performed.

"Non-oxygenated hydrocarbon" means organic emissions measured by a flame ionization detector excluding methanol.

~~"Off-Road Large Spark-Ignition Engines" or "Engines" are identified as: gasoline or alternate fuel powered internal combustion engines 25 horsepower and greater, operated on or in any device by that which any person or property may be propelled, moved or drawn upon a~~

~~highway, but are primarily used off a highway. The engines are designed for powering material handling vehicles, welders, man lifts, airport tugs, various construction and industrial implements and equipment. They are designed to be used in, but are not limited to use in, the following applications: airport baggage tractors, forklift trucks, material handling trucks, portable generators, turfcare equipment, concrete saws, and other miscellaneous applications.~~

"Off-Road Large Spark-ignition Engines" or "LSI Engines" means any engine that produces a gross horsepower 25 and greater horsepower or is designed (e.g., through fueling, engine calibrations, valve timing, engine speed modifications, etc.) to produce 25 and greater horsepower. If an engine family has models at or above 25 horsepower and models below 25 horsepower, only the models at or above 25 horsepower would be considered LSI engines. The engine's operating characteristics are significantly similar to the theoretical Otto combustion cycle with the engine's primary means of controlling power output being to limit the amount of air that is throttled into the combustion chamber of the engine. LSI engines or alternate fuel powered LSI internal combustion engines are designed for powering, but not limited to powering, forklift trucks, sweepers, generators, and industrial equipment and other miscellaneous applications. 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, are specifically excluded from this category.

Specifically excluded from this category are: 1) engines operated on or in any device used exclusively upon stationary rails or tracks; 2) engines used to propel marine vessels; 3) internal combustion engines attached to a foundation at a location for at least 12 months; 4) ~~transportable engines subject to District permitting rules that have been operated at a location for a period of one year or more on January 1, 1997~~ off-road recreational vehicles and snowmobiles; and 5) stationary or transportable gas turbines for power generation

* * * *

"Peak torque speed" means the speed at ~~that~~ which an engine develops maximum torque.

"Percent load" means the fraction of the maximum available torque at a specified engine speed.

"Precision" means the standard deviation of replicated measurements.

"Rated speed" means the speed at ~~that~~ which the manufacturer specifies the maximum rated horsepower of an engine.

"Reconfigured emission-data engine" means an emission-data engine obtained by modifying a previously used emission-data engine to represent another emission-data engine.

"Scheduled maintenance" means any adjustment, repair, removal, disassembly, cleaning, or replacement of equipment or engine components or systems required by the manufacturer that is performed on a periodic basis to prevent part failure or equipment ~~(if the engine were installed in a piece of equipment)~~ or engine malfunction, or anticipated as necessary to correct an overt indication of equipment or engine malfunction or failure for ~~that~~ which periodic maintenance is not appropriate.

* * * *

"Standard equipment" means those features or equipment that are marketed on a product over ~~that~~ which the purchaser can exercise no choice.

"System" includes any engine modification that controls or causes the reduction of substances emitted from an engine or piece of equipment.

"Test engine" means any engine used in certification, production line testing, quality audit, or compliance testing. A test engine can be a prototype engine or a production engine depending on the testing program in ~~that~~ which it is used.

"Test Procedures" means the procedures specified in both Part I and Part II of the "California Exhaust Emission Standards and Test Procedures for New 2001 and Later Off-Road Large Spark-Ignition Engines."

* * * *

"Unscheduled maintenance" means any inspection, adjustment, repair, removal, disassembly, cleaning, or replacement of engine, equipment, or vehicle components or systems that is performed to correct or diagnose a part failure or equipment or vehicle (if the engine were installed in a vehicle) malfunction that was not anticipated.

"Useful life" means~~, for purposes of the emissions defect warranty,~~ a period of 7 years or 5000 hours of operation, whichever first occurs for engines having engine displacement greater than 1.0-liter, and ~~5~~ 2 years or ~~3000~~ 1,000 hours of operations, whichever occurs first, for engines having engine displacement equal to or less than 1.0-liter. However, in no case may this period be less than the manufacturer's basic mechanical warranty period for the engine family.

"Zero (0) hours" means that point after normal assembly line operations and adjustments are completed and before fifty (50) additional operating hours have been accumulated, including emission testing, if performed.

3. Abbreviations.

(a) The abbreviations in this section apply to these provisions and have the following meanings:

* * * *

CH_4--Methane.
CL--Chemiluminescence.
CLD--Unheated chemiluminescence detector.
CO_2 --Carbon dioxide.

* * * *

hr--hour(s).

H_2O--water

* * * *

MeOH--Methanol (CH_3OH).

* * * *

N_2--Nitrogen.
NDIR-Nondispersive infrared.
NH_3--Ammonia.

* * * *

SO_2 --Sulfur dioxide.

* * * *

(b) The symbols defined in this section apply to this part and have the following meanings and units:

Symbol	Meaning	Unit
A_p	Cross sectional area of the isokinetic sampling probe	m^2
A_T	Cross sectional area of the exhaust pipes	m^2

* * * *

V_{SAM}	Volume of sample through particulate sampling filters	m^3
T_{Dd}	Absolute dewpoint temperature	K
V_{EXHD}	Exhaust gas volume flow rate on dry basis	m^3/h
V_{AIRW}	Intake air volume flow rate on wet basis	m^3/h
V_{DILW}	Dilution air volume flow rate on wet basis	m^3/h
V_{EDFW}	Equivalent diluted volume flow rate on wet basis	m^3/h
p_B	Total barometric pressure	kPa
V_{EXHW}	Exhaust gas volume flow rate on wet basis	m^3/h
V_{TOTW}	Diluted exhaust gas volume flow rate on wet basis	m^3/h
WF	Weighting factor	
WF_E	Effective weighting factor	

4. General Standards; Increase in Emissions; Unsafe Conditions.

* * * *

5. Adjudicatory Hearing.

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6. Maintenance of Records; Submittal of Information; Right of Entry.

(a) The manufacturer of any new large spark-ignition off-road engine subject to any of the standards or procedures prescribed herein shall establish, maintain and retain the following adequately organized and indexed records.

(1) **General records**.

(i) The records required to be maintained by this paragraph shall consist of:

(A) Identification and description of all certification engines for ~~that~~ which testing is required under these procedures.

* * * *

(2) **Individual records**.

(i) A brief history of each off-road large spark-ignition engine used for certification under these procedures including:

(A) In the case where a current production engine is modified for use as a certification engine, a description of the process by ~~that~~ which the engine was selected and of the modification made. In the case where the certification engine is not derived from a current production engine, a general description of the buildup of the engine (e.g., experimental heads, air intake manifolds, cams, and valves were cast and machined according to supplied drawings, etc.). In both cases above, a description of the origin and selection process for the closed-loop air/fuel system components (carburetor and/or fuel injection components and feedback sensor(s)), auxiliary emission control system components, exhaust emission control system components, and exhaust aftertreatment devices as applicable, shall be included. The required descriptions shall specify the steps taken to assure that the engine used for certification with respect to air/fuel system, emission control system components, exhaust aftertreatment devices, exhaust emission control system components, or any other devices or components, as applicable that can reasonably be expected to influence exhaust emissions, as applicable, will be representative of production engines, and that all components and/or engine construction processes, component inspection and selection techniques, and assembly techniques employed in the construction of the certification engines are reasonably likely to be implemented for production engines, or that they are as closely analogous as practicable to planned construction and assembly processes.

* * * *

(3) All records, other than routine emission test records, required to be maintained under these procedures shall be retained by the manufacturer for a period of eight (8) years after issuance of all Executive Orders to ~~that~~ which they relate. Routine emission test records shall be retained by the manufacturer for a period of two (2) year after issuance of all Executive Orders to ~~that~~ which they relate. Records may be retained as hard copy or reduced to microfilm, electronic format, punch cards, etc., depending on the record retention procedures of the manufacturer, **provided,** which in every case all the information contained in the hard copy shall be retained.

* * * *

(c) (3) In order to allow the Executive Officer to determine whether or not production off-road large spark-ignition engines conform in all material respects to the design specifications that applied to those engines described in the application for certification for ~~that~~ which an Executive Order has been issued, any manufacturer shall admit, or cause to be admitted, to any of the following facilities any ARB Enforcement Officer upon presentation of credentials or if necessary, an inspection warrant obtained pursuant to the California Code of Civil Procedures, Section 1822.50 et seq.

* * * *

(7) For the purposes of this paragraph (c):

(i) "Presentation of credentials" shall mean display of the document designating a person as an ARB Enforcement Officer.

(ii) Where equipment, vehicle, component, or engine storage areas or facilities are concerned, "operating hours" shall mean all times during ~~that~~ which personnel other than custodial personnel are at work in the vicinity of the area or facility and have access to it.

(iii) Where facilities or areas other than those covered by paragraph (c)(7)(ii) of this section are concerned, "operating hours" shall mean all times during ~~that~~ which an assembly line is in operation or all times during ~~that~~ which testing, maintenance, service accumulation, production or compilation of records, or any other procedure or activity related to certification testing, to translation of designs from the test stage to the production stage, or to engine (or equipment) manufacture or assembly is being carried out in a facility.

* * * *

7. Emission Standards for 2001 and Later Model Year Off-Road Large Spark-Ignition Engines.

(a) (1) Exhaust emissions from new 2001 and later model year off-road large spark-ignition engines shall not exceed the following:

(i) ~~(A)~~ **Hydrocarbons plus Oxides of Nitrogen**. ~~3.0 grams per brake horsepower-hour, as measured under steady state operating conditions at zero-hour (without accumulative deteriorated engine effects) for engines having a total engine displacement equal to or greater than 1.0-liter.~~

~~(B)~~ **Hydrocarbons plus Oxides of Nitrogen**. ~~5.0 grams per brake horsepower-hour, as measured under steady state operating conditions at zero-hour (without accumulative deteriorated engine effects) for engines having a total engine displacement less than 1.0-liter.~~

~~(ii)~~ **Carbon Monoxide**. ~~37.0 grams per brake horsepower-hour, as measured under steady state operating conditions.~~

~~(2) Exhaust emissions from new 2004 and later model year off-road large spark-ignition engines shall not exceed the following:~~

~~(i)~~ ~~(A)~~ **Hydrocarbons plus Oxides of Nitrogen**. ~~3.0 grams per brake horsepower-hour, as measured under steady state operating conditions with accumulative deteriorated engine effects for engines having a total engine displacement equal to or greater than 1.0-liter.~~

~~(B)~~ **Hydrocarbons plus Oxides of Nitrogen**. ~~5.0 grams per brake horsepower-hour, as measured under steady state operating conditions with accumulative deteriorated engine effects for engines having a total engine displacement less than 1.0-liter.~~

~~(ii)~~ **Carbon Monoxide**. ~~37.0 grams per brake horsepower-hour, as measured under steady state operating conditions.~~

Exhaust Emission Standards
(grams per brake horsepower-hour)
[grams per kilowatt-hour][1]

Model Year	Engine Displacement	Durability Period	Hydrocarbon plus Oxides of Nitrogen	Carbon Monoxide
2002 and subsequent	≤1.0 liter	1,000 hours or 2 years	9.0 [12.0]	410 [549]
2001 - 2003[2],[3]	> 1.0 liter	N/A	3.0 [4.0]	37.0 [49.6]
2004 - 2006[4]	> 1.0 liter	3500 hours or 5 years	3.0 [4.0]	37.0 [49.6]
2007 and subsequent	> 1.0 liter	5000 hours or 7 years	3.0 [4.0]	37.0 [49.6]

Note: (1) Standards in grams per kilowatt-hour are given only as a reference. Pollutant emissions reported to ARB by manufacturers must be in grams per brake horsepower-hour.

(2) Small volume manufacturers are not required to comply with these emission standards.

(3) Manufacturers must show that at least 25 percent of its California engine sales comply with the standards in 2001, 50 percent in 2002, and 75 percent in 2003.

(4) The standards for in-use compliance for engine families certified to the standards in the row noted are 4.0 g/bhp-hr (5.4 g/kW-hr) hydrocarbon plus oxides of nitrogen and 50.0 g/bhp-hr (67.0 g/kW-hr) carbon monoxide, with a useful life of 5000 hours or 7 years. In-use averaging, banking, and trading credits may be generated for engines tested in compliance with these in-use compliance standards. If the in-use compliance level is above 3.0 but does not exceed 4.0 g/bhp-hr hydrocarbon plus oxides of nitrogen or is above 37.0 but does not exceed 50.0 g/bhp-hr carbon monoxide, and based on a review of information derived from a statistically valid and representative sample of engines, the Executive Officer determines that a substantial percentage of any class or category of such engines exhibits within the warranty periods noted in Section 2435, Title 13, California Code of Regulations, an identifiable, systematic defect in a component listed in that section, which causes a significant increase in emissions above those exhibited by engines free of such defects and of the same class or category and having the same period of use and hours, then the Executive Officer may invoke the enforcement authority under Section 2439, Title 13, California Code of regulations to require remedial action by the engine manufacturer. Such remedial action is limited to owner notification and repair or replacement of defective components, without regard to the requirements set forth in Section 2439(b)(5) or Section 2439(c)(5)(B)(vi). As used in the section, the term “defect” does not include failures that are the result of abuse, neglect, or improper maintenance.

(b) Reserved

(c) No crankcase emissions shall be discharged into the ambient atmosphere from any new 2004 or later model year off-road large spark-ignition engines.

(d) Reserved

8. Application for certification.

* * * *

(b) The application shall be in writing, signed by an authorized representative of the manufacturer, and shall include the following:

(1) (i) Identification and description of the engines covered by the application and a description of their emission control system and fuel system components. This shall include a detailed description of each AECD to be installed in or on any certification test engine.

(ii) (A) The manufacturer shall provide to the Executive Officer in the application for certification:

(1) A list of those parameters that are physically capable of being adjusted (including those adjustable parameters for ~~that~~ which access is difficult) and that, if adjusted to settings other than the manufacturer's recommended setting, may affect emissions;

* * * *

(C) The Executive Officer may require to be provided detailed drawings and descriptions of the various emission-related components and/or hardware samples of such components, for the purpose of making his determination of ~~that~~ which engine parameter will be subject to adjustment for new certification and new engine compliance testing and of the physically adjustable range for each such engine parameter.

(2) Projected California sales data sufficient to enable the Executive Officer to select a test fleet representative of the engines for ~~that~~ which certification is requested.

* * * *

9. Approval of Application for Certification; Test Fleet Selections; Determinations of Parameters Subject to Adjustment for Certification and New Engine Compliance Testing, Adequacy of Limits, and Physically Adjustable Ranges.

* * * *

(d) (2) (i) The Executive Officer shall determine a parameter to be adequately inaccessible or sealed if:

(A) In the case of an idle mixture screw, the screw is recessed within the carburetor casting and sealed with lead, thermosetting plastic, or an inverted elliptical spacer; or the screw is sheared off after adjustment at the factory, and the inaccessibility is such that the screw cannot be accessed and/or adjusted with simple tools in one-half hour or ~~for~~ $52 (1998 dollars) or less.

(B) In the case of a choke bimetal spring, the plate covering the

bimetal spring is riveted or welded in place, or held in place with nonreversible screws.

(C) In the case of a parameter that may be adjusted by elongating or bending adjustable members (e.g., the choke vacuum break), the elongation of the adjustable member is limited by design or, in the case of a bendable member, the member is constructed of a material that when bent would return to its original shape after the force is removed (plastic or spring steel materials).

(D) In the case of any other parameter, the manufacturer demonstrates that adjusting the parameter to settings other than the manufacturer's recommended setting cannot be performed in one-half hour or costing more than ~~for~~ $52 (1998 dollars). ~~or less.~~

* * * *

(d)(3) (ii) (A) In the case of a parameter determined to be adequately inaccessible or sealed, the Executive Officer shall include within the physically adjustable range applicable to testing under the Production-Line Testing Procedure, only the actual settings to ~~that~~ which the parameter is adjusted during production.

(B) In the case of other parameters, the Executive Officer shall include within this range all settings within physical limits or stops determined to be adequate restraints on adjustability, as they are actually located on the test engine.

(e) (1) If the manufacturer submits the information specified in Section 8(b)(1)(ii) in advance of its application for certification, the Executive Officer shall review the information and make the determinations required in paragraph (d) of this section within 90 days of the manufacturer's submittal as required by Section 60030, Title 17, California Code of Regulations.

(2) The 90-day decision period is exclusive of the elapsed time during ~~that~~ which ARB may request additional information from manufacturers regarding an adjustable parameter and the receipt of the manufacturers' response(s).

* * * *

10. Required data for certification.

* * * *

(a) (3) A statement that the engines for ~~that~~ which certification is requested conform to the requirements in Section 4, and that the descriptions of tests performed to ascertain compliance with the general standards in Section 4, and the data derived from such tests, are available to the Executive Officer upon request.

(4) A statement that the test engines with respect to ~~that~~ which data are submitted to demonstrate compliance with the applicable standards of these procedures are in all material respects as described in the manufacturer's application for certification, have been tested in accordance with the applicable test procedures utilizing the fuels and equipment described in the application for certification and that on the basis of such tests the engines conform to the requirements of this part. If such statements cannot be made with respect to any engine tested,

the engine shall be identified, and all pertinent data relating thereto shall be supplied to the Executive Officer. If, on the basis of the data supplied and any additional data as required by the Executive Officer, the Executive Officer determines that the test engine was not as described in the application for certification or was not tested in accordance with the applicable test procedures utilizing the fuels and equipment as described in the application for certification, the Executive Officer may make the determination that the engine does not meet the applicable standards. The provisions of Section 16(b) shall then be followed.

(b) The above information must be provided unless the Executive Officer, upon request of the manufacturer, waives the requirement. The Executive Officer may waive any requirement of this section for testing of an engine for ~~that~~ which emission data are available or will be available under the provisions of Section 15.

* * * *

(c) (4) For each engine family for ~~that~~ which a certificate is requested:

(i) Provide a statement that the results obtained by the alternative measurement procedure correlate with the results that would be expected when determined by the Test Procedures and

(ii) Provide these results, adjusted if necessary with the applicable correlation offset, to be compared with the standards of Section 7(a).

11. Test Engines.

(a) **Engine Families and Engine Family Groups.**

* * * *

(5) Engines identical in all the respects listed in paragraph (a)(2) of this section but which use differing fuels may be certified as one engine family, provided the engine family be certified using the fuel that would yield the worst-case emission scenario.

* * * *

(c) In lieu of testing an emission-data engine selected under paragraph (b) of this section, and submitting data therefore, a manufacturer may, with the prior written approval of the Executive Officer, submit exhaust emission data as applicable on a similar engine, for ~~that~~ which certification has previously been obtained or for ~~that~~ which all applicable data required under Section 10 has previously been submitted.

(d) **Durability-data Engine**

(1) The engine manufacturer shall select the engine configuration that best represents the entire engine family or groups of engine family to demonstrate engine and emission durability. The duration of the engine durability demonstration shall be ~~no less than the defined~~ equivalent to the useful life hour period as defined in these Test Procedures.

~~(2) The engine manufacturer shall conduct the selected engine durability / service accumulation test based on manufacturer's specific service accumulation cycle, providing such service accumulation cycle is acceptable by the Executive Officer. The acceptance of manufacturer's specific service accumulation cycle shall be based on manufacturer's ability to demonstrate good engineering judgement for the use such cycle. In the absence of manufacturer's specific service accumulation cycle, engine durability demonstration shall be conducted using multiple runs of the ISO 8178, Part IV, test cycle C-2, or for constant speed engine's using multiple runs of the ISO 8178, Part IV, D-2 test cycle. Regardless of which service accumulation cycle is used for generating the deterioration factors for emissions certification, the Executive Officer shall accept for the first year manufacturer's deterioration factors for certification; but, may deny the use of the manufacturer's deterioration factors for subsequent certification base on incorrect or inactuate representativeness of actual in-use emissions test results.~~

~~(3) The engine manufacturer may request with the advanced approval of the Executive Officer to reduce the total amount of service accumulation hours for any durability / service accumulation engine. The engine manufacturer may make such request only after an engine has accumulated at a minimum 60 percent (60%) of the engine's defined useful life period. The Executive Officer shall base such approval on engine's durableness, maintenance events, emission test results, and the stability of engine out emissions.~~

(2) (i) The engine manufacturer shall use good engineering practice to determine engine and emission durability.

(ii) The engine manufacturer shall provide the Executive Officer with a written plan of the method used to determine engine and emission durability. The Executive Officer shall approve the plan if it demonstrates, according to good engineering judgement, the development of reasonable deterioration factors. The engine manufacturer shall not proceed with testing until the Executive Officer has approved the plan.

(iii) In the absence of a manufacturer's specific service accumulation cycle, engine durability demonstration shall be conducted using multiple runs of the ISO 8178, Part IV, test cycle C-2, or for constant speed engine's using multiple runs of the ISO 8178, Part IV, D-2 test cycle. The engine manufacturer may request with the advanced approval of the Executive Officer to reduce the total amount of service accumulation hours for any durability / service accumulation engine. The engine manufacturer may make such request only after an engine has accumulated at a minimum one half of the engine's defined useful life period. The Executive Officer shall base such approval on engine's durableness, maintenance events, emission test results, and the stability of engine out emissions.

(3) Regardless of which service accumulation cycle is used for generating the deterioration factors for emissions certification, the Executive Officer shall accept the manufacturer's deterioration factors for certification the first year; but, may deny the use of the manufacturer's deterioration factors for subsequent certification based on incorrect or inaccurate representativeness of actual in-use emissions test results.

12. Maintenance.

* * * *

(a)(3)(ii) (B) Survey data ~~that~~ which adequately demonstrates that, at an 80 percent confidence level, 80 percent of such engines already have this critical maintenance item performed in-use at the recommended interval(s).

* * * *

(D) A survey, approved by the Executive Officer, showing that a critical maintenance item is likely to be performed without a visible signal on a maintenance item for ~~that~~ which there is no prior in-use experience without the signal. To that end, the manufacturer may in a given model year market up to 200 randomly selected engines per critical emission-related maintenance item without such visible signals, and monitor the performance of the critical maintenance item by the owners to show compliance with paragraph (a)(3)(ii)(B) of this section. This option is restricted to two consecutive model years and may not be repeated until any previous survey has been completed. If the critical maintenance involves more than one engine family, the sample will be sales weighted to ensure that it is representative of all the families in question.

* * * *

(a) (4) (i) In the case of any new scheduled maintenance, the manufacturer must submit a request for approval to the Executive Officer for any maintenance that it wishes to recommend to purchasers. New scheduled maintenance is that maintenance ~~that~~ which did not exist prior to the 2001 model year, including that which is a direct result of the implementation of new technology not found in production prior to the 2001 model year. The manufacturer must also include its recommendation as to the category (**i.e.**, emission-related or non-emission-related, critical or non-critical) of the subject maintenance and, for suggested emission-related maintenance, the maximum feasible maintenance interval. Such request must include detailed evidence supporting the need for the maintenance requested, and supporting data or other substantiation for the recommended maintenance category and for the interval suggested for emission-related maintenance. Requests for new scheduled maintenance must be approved prior to the introduction of the new maintenance. The Executive Officer will then designate the maintenance as emission-related or non-emission-related. For maintenance items established as emission-related, the Executive Officer will further designate the maintenance as critical if the component that receives the maintenance is a critical component under paragraph (a)(3) of this section. For each maintenance item designated as emission-related, the Executive Officer will also establish a technologically necessary maintenance interval, based on industry data and other information available to ARB. Designations of emission-related maintenance items, along with their identification as critical or non-critical, and establishment of technologically necessary maintenance intervals, will be announced through the certification process.

* * * *

(d) **Durability-data Engine**

(1) The manufacturer ~~Manufacturer~~ may conduct scheduled (routine/scheduled maintenance items as normally appears in the engine owner's manual) engine maintenance during the durability / service accumulation cycle test. The ~~routine~~ maintenance shall be ~~limited to changing or adding of engine lubrication oil(s) and fluid(s), and air filter changes. Additional maintenance shall be based on criteria~~ consistent with the maintenance requirements set forth in Section 12(a).

* * * *

13. Service Accumulation; Emission Measurements.

(a) (1) The manufacturer shall determine the engine operating schedule to be used for dynamometer service accumulation on emission-data engines selected under Section 11(b). This determination shall be consistent with good engineering practice. A single engine operating schedule shall be used for all engines in an engine family group-control system combination. Operating schedules may be different for different combinations.

(2) The manufacturer shall determine, for each engine family or group of engine families, the number of hours at ~~that~~ which the engine-system combination is stabilized (no more than 50 hours for catalyst equipped) for emission-data testing.

* * * *

14. Test Procedures, General Requirements.

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15. Confirmatory Testing by the Executive Officer.

(a) The Executive Officer may require that a manufacturer provide to the ARB one or more of the test engines for confirmatory testing at the manufacturer's expense. Such testing shall take place at such place or places as the Executive Officer may designate. The Executive Officer may specify that he will conduct such testing at the manufacturer's facility, in ~~that~~ which case instrumentation and equipment specified by the Executive Officer shall be made available by the manufacturer for test operations. Any testing conducted at a manufacturer's facility pursuant to this paragraph shall be scheduled by the manufacturer as promptly as possible.

* * * *

16. Certification.

* * * *

(a) (3) One such Executive Order will be issued for each engine family ~~group~~.

(b) (1) The Executive Officer will determine whether an engine covered by the application complies with applicable standards by observing the following relationships:

(i) An emission-data test engine selected under Section 11(b)(3) shall represent all engines in the same engine-system combination.

(ii) An emission-data test engine selected under Section 11(b)(3) shall represent all engines containing ~~of~~ that emission control system and having similar ~~at the~~ peak horsepower ~~torque fuel delivery of the test engine~~.

(2) The Executive Officer will proceed as in paragraph (a) of this section with respect to the engines belonging to an engine family group, all of ~~that~~ which comply with all applicable standards.

* * * *

(c) (3) In any case in ~~that~~ which a manufacturer knowingly submits false or inaccurate information or knowingly renders inaccurate or invalid any test data or commits any other fraudulent acts and such acts contribute substantially to the Executive Officer's decision to issue an Executive Order, the Executive Officer may deem such certificate void **ab initio**.

(4) In any case in ~~that~~ which certification of an engine is proposed to be withheld, denied, revoked, or suspended under paragraph (c)(1)(iii) or (iv) of this section, and in ~~that~~ which the Executive Officer has presented to the manufacturer involved reasonable evidence that a violation of Section 6(c) in fact occurred, the manufacturer shall have the burden of establishing any contention to the satisfaction of the Executive Officer that even though the violation occurred, the engine in question was not involved in the violation to a degree that would warrant withholding, denial, revocation, or suspension of certification under either paragraph (c)(1)(iii) or (iv) of this section.

* * * *

17. Addition of an Engine After Certification.

* * * *

18. Changes to an Engine Covered by Certification.

(a) The manufacturer shall notify the Executive Officer of any change in production engines in respect to any of the parameters listed in ~~Section 11(a)(3), Section 11(b)(1)(iii), Section 11(b)(2)(iii) or Section 11(b)(3)(iii)~~Section 11(a)(1) thru 11(a)(4), as applicable, giving a full description of the change. Such notification shall be in advance of the changes unless the manufacturer elects to follow the procedure described in Section 19.

* * * *

19. Alternative Procedures for Notification of Additions and Changes.

* * * *

20. Submission of Engine Identification Numbers.

(a) Upon request of the Executive Officer, the manufacturer of any off-road large spark-ignition engine covered by an Executive Order shall, within 30 days, identify by engine identification number or alternative tracking method, the engine(s) covered by the Executive Order.

* * * *

21. Production Engines.

Any ~~heavy-duty~~ off-road large spark-ignition engine manufacturer obtaining certification under this part shall notify the Executive Officer, on a yearly basis, of the number of engines of such engine family-engine displacement-exhaust emission control system-fuel system combination produced for sale in California during the preceding year.

22. Maintenance Instructions.

* * * *

23. Submission of Maintenance Instructions.

* * * *

24. Alternative Certification Procedures.

(a) (1) The Executive Officer shall determine that of the following certification procedures (paragraph (a)(3) or (a)(4) of this section), if any, may be used to demonstrate compliance for each off-road large spark-ignition engine family group for ~~that~~ which certification is sought. In making this determination, the Executive Officer will consider whether the following criteria have been met.

* * * *

(3) (ii) As specifically allowed by the Executive Officer, the manufacturer shall assume the responsibility for part or all of the decisions applicable to the family group for ~~that~~ which certification is sought and that are within the jurisdiction of the Executive Officer, with the exception that the Executive Officer shall determine whether a test engine has met the applicable emission standards.

(iii) The manufacturer shall maintain, update, and correct all records and information required.

(iv) The Executive Officer may review a manufacturer's records at any time. At the Executive Officer's discretion, this review may take place either at the manufacturer's facility or at another facility designated by the Executive Officer.

(v) At the Executive Officer's request, the manufacturer shall notify the Executive Officer of the status of the certification program, including projected schedules of those significant accomplishments specified by the Executive Officer.

(vi) The manufacturer shall permit the Executive Officer to inspect any facilities, records, and vehicles from ~~that~~ which data are obtained under the abbreviated certification review procedure.

* * * *

25. Test Fuel.

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State of California
AIR RESOURCES BOARD

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR NEW 2001 AND LATER OFF-ROAD LARGE SPARK-IGNITION ENGINES

PART II

Adopted: _____

NOTE: This document incorporates by reference the International Standards Organization (ISO) 8178 test procedure, Part 1, August 15, 1996, Part 4, August 15, 1996, and Part 5, May 15, 1998, with modifications. The symbol "* * * *" means that the remainder of the ISO text for a specific section is not shown in these procedures but has been included by reference, unchanged.

This document is printed in a style to indicate changes from the originally proposed provisions. All originally proposed language is indicated by plain type. The suggested modifications are shown in underline to indicate additions to the original proposal and ~~strikeout~~ to indicate deletions. Only those portions containing the suggested modifications from the language contained in the original mailout, MSC 98-20, are included. All other portions remain unchanged and are indicated by the the symbol "* * * *" for reference. All proposed modifications will be made available to the public for a 15-day comment period.

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES
FOR NEW 2001 AND LATER OFF-ROAD LARGE SPARK-IGNITION ENGINES

PART II

To the extent the following provisions of ISO 8178, Part 1, August 15, 1996, Part 4, August 15, 1996, and Part 5, May 15, 1998, pertain to the testing and compliance of exhaust emissions from off-road large spark-ignition engines, they are adopted and incorporated herein by this reference as Part II of the California Exhaust Emission Standards and Test Procedures for New 2001 and Later Off-Road Large Spark-Ignition Engines (Test Procedures), except as altered or replaced by the provisions set forth below.

Since the scope of this regulation is limited to off-road spark-ignition engines, the ISO provisions contained in the procedure identified above which pertain to Diesel cycle engines or to engines used for applications other than off-road purposes shall not be applicable to Part II of these Test Procedures.

International Standards Organization (ISO) 8178, RIC Engines - Exhaust emission measurement - Part 1: Test bed measurement of gaseous and particulate exhaust emissions from RIC engines.

* * * *

ISO 8178, RIC Engines - Exhaust emission measurement - Part 4: Test cycles for different engine applications.

* * * *

8.7 Test cycles type G "Utility, lawn and garden", typically ~~< 20 KW~~ < 25 hp.

DELETE all reference to G-2 and G-3 test cycles.

ADD:

Note: Manufacturers may use the G-1 test cycle for engines equal to or less than ~~1,000cc~~ 1.0 liter ~~with prior approval from the Executive Officer~~. Manufacturer must show that the engines tested with the G-1 test cycle have ~~similar~~ engine characteristics and operating characteristics ~~as~~ similar to small off-road equipment engines (less than 25 hp).

* * * *

ISO 8178, RIC Engines - Exhaust emission measurement - Part 5: Test fuels.

* * * *

State of California
AIR RESOURCES BOARD

CALIFORNIA EXHAUST EMISSIONS STANDARDS AND TEST PROCEDURES FOR {~~1995~~ 1997} AND LATER OFF-HIGHWAY RECREATIONAL VEHICLES AND ENGINES

Adopted: May 26, 1995

Amended:

NOTE: This document incorporates by reference, with noted modifications, sections of Subparts E and F, Part 86, Title 40, Code of Federal Regulations. California provisions which replace specific federal provisions are denoted by the words "DELETE" for the federal language and "REPLACE WITH" or "ADD" for the new California language. The symbols "* * * *" and "..." mean that the federal text that immediately follows the symbols is unchanged and incorporated by reference into the California Standards and Test Procedures.

This Document is printed in a style to indicate changes from the text approved by the Board at its October 22, 1998 hearing on large off-road spark-ignition engines. All existing language is indicated by plain type. All approved additions to the language are indicated by single underline. All approved deletions to the language are indicated by ~~strikeout~~. Only those portions containing the suggested modifications from the language contained in the original mailout, MSC 98-20, are included. All other portions remain unchanged and are indicated by the the symbol "* * * *" for reference. All proposed modifications will be made available to the public for a 15-day comment period.

The included portions of Sections 86.402-78 and 86.410-90 of the Test Procedures for off-highway recreational vehicles and engines (OHRV) includes text appearing within { } which consists of amendments approved by the Board at the December 11, 1998 hearing on OHRV, along with additional modifications to the OHRV text proposed in a separate 15-day notice of modified text on that item. Although approved by the Board, text appearing within { } have not yet been submitted to the Office of Administrative Law (OAL) and are not yet legally effective. Text appearing within { } that are not approved by the OAL before the effective date of this regulation will not appear in this regulation when final.

CALIFORNIA EXHAUST EMISSIONS STANDARDS AND TEST PROCEDURES FOR {~~1995~~ 1997} AND LATER OFF-HIGHWAY RECREATIONAL VEHICLES AND ENGINES

The following provisions of Subpart E and F, Part 86, Title 40, Code of Federal Regulations, as adopted or amended by the U. S. Environmental Protection Agency on the date listed are adopted and incorporated herein by this reference as the California Exhaust Emission Standards and Test Procedures for {~~1995~~ 1997} and Later Off-Highway recreational vehicles and engines, except as altered or replaced by the provisions set forth below.

Subpart E, General Provisions for Emission Regulations for 1978 and Later New Motorcycles

SOURCE: 42 FR 1126, Jan. 5, 1977, unless otherwise noted.

* * * *

ADD:
"All-Terrain Vehicle" means any motorized off-highway vehicle 50 inches (1270 mm) or less in overall width, {~~with an unladen dry weight of {606 600} pounds (275 kg) or less,~~} designed to travel on four low pressure tires, having a seat designed to be straddled by the operator and handlebars for steering control, and intended for use by a single operator and no passengers. The vehicle is designed to carry not more than 350 pounds (160 kg) payload, excluding the operator, and is powered by an internal combustion engine. Width {~~and unladen weight~~} shall be exclusive of accessories and optional equipment. A {~~go-kart,~~} golf cart {~~or specialty vehicle~~} is not, for purposes of this regulation, to be classified as an all-terrain vehicle.{~~ An all-terrain vehicle that is not used exclusively in competition/racing events in a closed course is not a competition/racing vehicle for purposes of these regulations.~~}

* * * *

"Total Test Distance" DELETE,
REPLACE WITH:
"Total Test Distance" is defined as the appropriate distance the vehicle should be driven to stabilize the emission characteristics of the engine. The manufacturer shall determine the appropriate distance.

* * * *

86.410-90 Emission standards for 1990 and later model year motorcycles. 54 FR 14539, Apr. 11, 1989

* * * *

ADD:

(c) As an option to the standards set forth in section (a)(1) above, exhaust emissions from 1997 and later all-terrain vehicle engines {~~shall~~ must} not exceed the equivalent to the off-road motorcycle and all-terrain vehicle standard using the {~~utility~~} test procedures set forth in "California Exhaust Emission Standards and Test Procedures for 1995 and Later {~~Utility and Lawn and Garden Equipment~~ Small Off-Road} Engines", adopted March 20, 1992, and last amended {~~April 8, 1993~~ March 26, 1998}, which is hereby incorporated by reference herein. Compliance with the optional HC standard is based on a manufacturer's corporate average basis, as provided in (b) above.

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