

State of California
AIR RESOURCES BOARD

Proposed
August 1998

California Evaluation Procedures for New Aftermarket Non-Original Equipment Catalytic
Converters for Off-Road Vehicles, Engines, and Equipment

Adopted: _____

NOTE: This is a new document proposed for adoption by the Air Resources Board.

TABLE OF CONTENTS

I.	APPLICABILITY	<u>1</u>
II.	TESTING REQUIREMENTS	<u>1</u>
III.	OFF-ROAD CATEGORIES	<u>3</u>
IV.	TEST PROCEDURES AND STANDARDS	<u>4</u>
	A. Test Procedures	<u>4</u>
	B. Exhaust Emission Standards	<u>5</u>
	C. Submissions	<u>6</u>
V.	CONFIRMATORY TESTING	<u>6</u>
VI.	WARRANTY AND SAFETY STATEMENT	<u>6</u>
VII.	LABEL REQUIREMENTS	<u>7</u>
VIII.	REQUIRED INFORMATION	<u>8</u>
IX.	APPROVAL	<u>9</u>
X.	INSTALLATION REQUIREMENTS	<u>9</u>
XI.	QUALITY CONTROL	<u>10</u>

State of California
AIR RESOURCES BOARD

California Evaluation Procedures for New Aftermarket Non-Original Equipment Catalytic
Converters for Off-Road Vehicles, Engines, and Equipment

I. APPLICABILITY

California Vehicle Code Sections 27156 and 38391, and Section 2472, Title 13, California Code of Regulations (CCR), prohibit the sale or offer for sale, advertisement, or installation of any device which alters or modifies the original design or performance of any required motor vehicle pollution control device or system unless the device has been exempted by the California Air Resources Board (ARB) in accordance with Vehicle Code Section 27156 or 38395, and Section 2472, Title 13, CCR. Exemptions for new aftermarket non-original equipment catalytic converters as replacements for Original Equipment Manufacturers' (OEM) oxidation, three-way, or three-way plus oxidation (dual bed) catalytic converters shall be granted pursuant to these procedures and criteria. Catalytic converters which are considered to be replacement parts, i.e., new OEM converters and other converters meeting the criteria set forth in Section 1900(h)13, Title 13, CCR, do not require exemptions under Vehicle Code Sections 27156 and 38395, and Section 2472, Title 13, CCR.

Aftermarket non-original equipment ("non-OEM") catalytic converters which are exempted pursuant to these procedures shall not be installed on any vehicle/engine/equipment which is still within the vehicle/engine/equipment manufacturer's warranty period, unless the converter is missing. Documentation is required to ensure the need to replace the existing catalyst. An exempt aftermarket non-OEM catalytic converter can only replace a catalytic converter of the same type.

II. TESTING REQUIREMENTS

A application catalog shall be developed by the manufacturer to identify the specific vehicle/engine/equipment application by model year and engine displacement for each converter model. No change shall be made to the application catalog without prior approval pursuant to these procedures. Aftermarket non-OEM catalytic converters shall be identified as either oxidation, single-bed three-way, or dual-bed (with air injection). Each type (model) catalytic converter shall be evaluated independently.

Emissions Testing:

When the Executive Officer requires an aftermarket part catalytic converter manufacturer to perform emission testing, the applicant shall demonstrate compliance with the requirements of these test procedures using the procedures contained herein.

1) Requirements

The applicant shall submit a list of vehicles/engines/equipment for which the catalytic converter may be applied to, before commencing testing. The ARB shall inform the applicant as to which vehicle/engine/equipment may need to be tested. An applicant may be required to test more than one make or model if the device is applicable to more than one vehicle/engine/equipment. The “worst case” vehicle(s)/engine(s)/equipment from the application catalog of each type (model) new aftermarket non-OEM catalytic converter will be selected and tested for emissions.

The “worst case” vehicle/engine/equipment in each application category shall be determined based upon engine displacement and other factors which produce the greatest stress on emission related components. For example, a carbureted vehicle/engine/equipment will normally be selected for testing rather than a fuel injected vehicle/engine/equipment. Vehicles/Engines/Equipment selected for testing shall be approved as “worst case” by the ARB prior to emission testing.

After the ARB has informed the applicant as to which vehicle(s)/engine(s)/equipment shall be tested, the manufacturer shall choose a functional test engine that complies with the original certification standard. The baseline emissions of the test vehicle/engine/equipment with the OEM converter shall be determined using the appropriate test procedures as referenced below. The applicant shall establish that the test vehicle/engine/equipment meets the applicable emissions standards. The applicant may perform the necessary repairs to bring the emission levels down to the certification standard prior to testing. Once the baseline emissions have been established, the applicant shall then replace the OEM converter with the aftermarket converter and re-test the vehicle/engine/equipment using the same test procedures. The test vehicle/engine/equipment with the aftermarket converter must meet the applicable emission standards.

Applicants may submit an alternative test plan to determine the baseline emissions subject to the Executive Officer’s approval.

2) Emissions Testing

Emissions testing performed pursuant to these test procedures shall be conducted by a vehicle/engine/equipment exhaust emissions test laboratory.

The baseline testing shall follow the appropriate break-in period as specified in the exhaust emissions test procedures before commencing testing. Break-in periods for each off-road category are specified in the test procedures referenced below.

III. OFF-ROAD CATEGORIES

For the purposes of these procedures, off-road vehicles/engines/equipment and equipment are categorized as follows:

A. Small Off-Road Engines

Small Off-Road Engines include all engines less than 25 horsepower (hp) used in off-road mobile applications, with the exceptions of off-road motorcycles, all-terrain vehicles (ATV) and engines used to propel marine vessels or watercraft. New golf carts used in areas that do not meet the federal ozone standards will continue to have a zero-emission requirement. The proposed regulations are applicable to small off-road engines produced on or after January 1, 1995.

B. Off-Road Diesel Engines and Equipment

The heavy-duty off-road diesel cycle engine and equipment category consists of off-road diesel-cycle engines that are:

- (1) greater than or equal to 50 hp and less than 100 hp manufactured on or after January 1, 1998, and certified to meet the federal emission standards and certification provisions;
- (2) greater than or equal to 100 hp and less than 175 hp manufactured on or after January 1, 1997, and certified to meet the federal emission standards and certification provisions; and
- (3) diesel cycle and alternative fueled diesel cycle engines equal to 175 hp and above for off-road engines produced on or after January 1, 1996, and certified to meet California's exhaust emission standards and test procedures. This last category includes engines used in farm and construction equipment, as well as mining, forestry, and industrial equipment.

C. Off-Highway Recreational Vehicles and Engines

The off-road recreational vehicle subcategory includes off-road motorcycles, ATVs, go-karts, golf carts, and specialty vehicles. Engines used in these vehicles consist of both 2- and 4- stroke configurations and range in power from 8 hp for golf carts to over 30 hp for the larger off-road motorcycles and specialty vehicles. The proposed regulations are applicable to new specialty vehicle engines under 25 hp produced on or after January 1, 1995 and all other new small off-road

engines produced on or after January 1, 1997.

D. Gasoline Spark Ignition Marine Engines

The ARB is currently developing regulations for gasoline spark-ignition marine engines, including outboard engines and personal watercraft. Outboard engines are defined as integrated engine and drive units externally mounted to the hulls of the watercraft. Personal watercraft engines are defined as watercraft that are not outboards, inboards, or sterndrive engines. This encompasses watercraft typically thought of as personal watercraft; such engines encompass watercraft commonly known as personal watercraft (Jet Skis, Wave Runners, etc.) and jet boats (the newer class of inboard style watercraft using two-stroke jet propulsion).

Staff is currently scheduled to present its marine engine proposal to the Board in December of this year. Until the marine engine regulations are formally adopted, staff proposes to utilize the U.S. EPA's definitions, standards, and test procedures for gasoline spark-ignition marine engines as set out in 40 Code of Federal Regulations Part 91.

IV. TEST PROCEDURES AND STANDARDS

A. Test Procedures

1) Test Procedures for equipment for Small Off-Road Engines

For vehicles in Category I, the exhaust emission standards and test procedures set forth in "California Exhaust Emission Standards and Test Procedures for 1995 and Later Small Off-Road Engines," adopted_____, incorporated by reference in California Code of Regulations (CCR), Title 13, Section 2404.

2) Test Procedures for Off-Road Diesel Engines and Equipment

i) For 175 horsepower and greater:

"California Exhaust Emission Standards and Test Procedures for New 1996 and Later Heavy-Duty Off-Road Diesel Cycle Engines and Equipment", and "California Smoke Test Procedures for New 1996 and Later Heavy-Duty Off-Road Diesel Cycle Engines and Equipment Engines" emission standards and test procedures are applicable, incorporated by reference in Title 13, Section 2424.

ii) For greater than or equal to 50 horsepower and less than 175 horsepower:

"Emission Standards and Certification Provisions", Code of Federal Regulations, Part 40, Sections 89.112-96 and 89.113-96 and "Emission Test Equipment

Provisions” and “Exhaust Emission Test Procedures”, Part 40, Section 89, Subparts D and E.

3) Test Procedures for Off-Highway Recreational Vehicles and Engines

Emission standards and test procedures set forth in “California Exhaust Emissions Standards and Test Procedures for 1995 and Later Off-Highway Recreational Vehicles and Engines”, which incorporates by reference subpart E and F, Title 40, Code of Federal Regulations.

4) Test Procedures for Gasoline Spark Ignition Marine Engines

The ARB is currently developing regulations for gasoline spark-ignition marine engines, including outboard engines and personal watercraft. Outboard engines are defined as integrated engine and drive units externally mounted to the hulls of the watercraft. Personal watercraft engines are defined as watercraft that are not outboards, inboards, or sterndrive engines. This encompasses watercraft typically thought of as personal watercraft; such engines encompass watercraft commonly known as personal watercraft (Jet Skis, Wave Runners, etc.) and jet boats (the newer class of inboard style watercraft using two-stroke jet propulsion).

Staff is currently scheduled to present its marine engine proposal to the Board in December of this year. Until the marine engine regulations are formally adopted, staff proposes to utilize the U.S. EPA’s definitions, standards, and test procedures for gasoline spark-ignition marine engines as set out in 40 Code of Federal Regulations Part 91.

5) Alternative Test Plan

Applicants requesting certification for conversion systems for use in any of the above Categories may submit an alternative test plan subject to the Executive Officer’s approval.

B. Exhaust Emission Standards

1) For small off-road engines starting with engine model year 2000 and later:

To demonstrate compliance with the applicable emission standards, each emission test result shall be adjusted by the application of a deterioration factor. The Executive Officer shall specify the use of the certification deterioration factor provided in the original engine manufacturer's certification application for the model and model year of the test engine. The deteriorated emission test results shall be in compliance with these procedures only if they are equal to or less than the California new engine exhaust emission standards for the

test engine. The applicant shall be permitted one retest if the initial emission test results fail to demonstrate compliance with these procedures. The results of the initial test and the retest will be averaged, and the averaged result must comply with the standards set for the single test in order to demonstrate compliance.

2) All other off-road categories:

The add-on or modified part manufacturer shall demonstrate compliance with these procedures by showing that the exhaust emissions from the test vehicle/engine/equipment with the add-on or modified part installed are in compliance with the California new vehicle/engine/equipment exhaust emission standards for the vehicle/engine/equipment class and model year of the test vehicle/engine/equipment.

C. Submissions

The converter manufacturer shall submit the application catalog, the mileage accumulation/bench aging procedures and test procedures, as well as data from all emissions testing for each converter model.

V. CONFIRMATORY TESTING

The ARB may perform confirmatory tests to verify any submitted test data. Manufacturers must retain their test catalytic converters and vehicles/engines/equipment for thirty (30) calendar days after the complete test information is received by the ARB. If required, confirmatory tests shall be requested by the ARB within this 30 day period. If the results of the ARB confirmatory tests show that the test vehicle/engine/equipment with the non OEM catalyst does not meet the applicable certification standard, the catalytic converter design will not be accepted.

VI. WARRANTY AND SAFETY STATEMENT

The converter manufacturer shall warrant that its catalyst is free from defects in materials and workmanship that cause such catalysts to fail to conform with the emission reduction requirements specified in Section II. Based upon the off-road category for which the manufacturer is requesting an exemption, the following warranty period shall apply:

- A. For Small Off-Road Engines, the warranty period for the converter shall be for one year.
- B. For Off-Road Diesel Engines and Equipment, the warranty period for the converter shall be for a period of two and one-half years or 1500 hours of operation, whichever first occurs.

- C. For Off-Highway Recreational Vehicles and Engines, the warranty period for the converter shall be for a period of two and one-half years or 5,000 kilometers (3125 miles), whichever first occurs.
- D. For Gasoline Spark Ignition Marine Engines, the warranty period for the converter will be set forth at some future date by the Air Resources Board.

This warranty shall cover the full replacement costs, including the costs of diagnosis, labor, and parts (including any part on the vehicle/engine/equipment that is damaged due to a defect in the converter). The converter manufacturer shall provide with each converter a statement that the converter has been designed and manufactured to meet the warranty requirements. In addition, manufacturers shall provide a written safety statement that their catalytic converters will not in their operation, function, or malfunction result in any unsafe condition endangering the vehicle/engine/equipment, or occupants or persons or property in close proximity to the vehicle/engine/equipment. A sample of the manufacturer’s warranty and safety statements shall be submitted to the ARB for review in accordance with the requirements of this paragraph.

VII. LABEL REQUIREMENTS

The manufacturer shall label each catalytic converter with a permanent, non-destructible label or stamp identifying the manufacturer, the model, and the month and year of manufacture. The label or stamp shall be easily visible after installation of the converter according to the manufacturer’s instructions. The label information shall be in the following format:

CA/XX/YYYY/ZZZZ/O

- CA: Designates a California approved converter
- XX: Two letter code issued by the ARB
- YYYY: Numerical designation of the converter model
(supplied by the manufacturer)
- ZZZZ: Month and year of the manufacture
(e.g., “0199” represents January 1999)
- O: Designates Off-Road

Each converter manufacturer shall submit a sample of their label or stamp to the ARB for review.

VIII. REQUIRED INFORMATION

In addition to the information and data required in Sections II, IV, and V, the following information shall be supplied to the ARB for each model converter for which certification is being requested.

- A. Catalyst supplier and address.
- B. Catalyst description: oxidation, single-bed three-way, dual-bed three-way, etc.
- C. Number of each type of catalyst used per can.
- D. Physical description of catalyst system:
 - 1) Configuration (e.g., oval or round);
 - 2) Dimensions (e.g., length, width, height, etc.): weight, volume including design tolerances, active surface area (BET);
 - 3) Total active surface area including design tolerances.
- E. Container:
 - 1) Materials used;
 - 2) Technique of containment and restraint;
 - 3) Construction method;
 - 4) Insulation and shielding (converter and/or vehicle/engine/equipment).
- F. Substrate:
 - 1) Supplier's name and address.
 - 2) Description of configuration construction technique (e.g. extruded, laid-up, formed, Dravo disk, etc.).
 - 3) Substrate composition.
 - 4) Volume of substrate.
 - 5) Composition of active constituents in substrate.
 - 6) For monolithic substrates:
 - i) Number of cells per square inch of frontal area;
 - ii) Design tolerances;
 - iii) Nominal cell wall thickness.
 - 7) For pelleted substrates:
 - i) Pellet shape and dimensions;
 - ii) Pellet bulk density;
 - iii) If applicable, specify the use of more than one type of pellet (e.g., RH or Pt/Pd);

- iv) Geometrical distribution of pellets;
- v) Mean impregnation depth of active materials with the production tolerances.

G. Washcoat:

- 1) Composition of active constituents;
- 2) Total active material loading.

H. Active material:

- 1) Composition of active constituents;
- 2) Loading of each active material;
- 3) Total active material loading, including design tolerances.

IX. APPROVAL

After a review of the submitted information and any confirmatory test data (if generated), the ARB will determine whether a specific model complies with all the requirements in these procedures for new off-road aftermarket non-OEM catalytic converters. If the model complies, the ARB will issue the applicant an Executive Order exempting that model from the prohibitions of the Vehicle Code Sections 27156 and 38391 and 13, CCR, Section 2472. The converter model may then be marketed in California for those vehicles/engines/equipment listed in the manufacturer's application catalog. The applicant shall not use the Executive Order as an endorsement or approval by the Air Resources Board.

X. INSTALLATION REQUIREMENTS

Exemptions shall be applicable only for installations which comply with the following requirements. The converter shall:

- A) Be installed only in situations listed in Section I;
- B) Be installed in the same location as the original equipment catalytic converter;
- C) Be the proper catalytic converter for the vehicle/engine/equipment as determined and specified by the manufacturer's application catalog submitted to the ARB;
- D) Be installed such that any existing air injection components on the vehicle/engine/equipment are properly connected to the catalytic converter and are functioning;
- E) Be installed with all other required catalytic converters if more than one converter

was installed originally by the vehicle/engine/equipment manufacturer or if more than one converter was specified by the manufacturer.

- F) Be accompanied by the warranty and safety statements.

XI. QUALITY CONTROL

In order to ensure that the production line converters are equivalent to the specifications outlined in the Executive Order, manufacturers may submit their quality control procedures and the quality control procedures of their catalyst suppliers. If the manufacturer can demonstrate that these quality control procedures will produce converters which exhibit substantially similar emissions performance compared with the catalysts used for evaluation of the converter model, testing may not be required. Manufacturers shall have their quality control procedures approved by the Executive Officer prior to production. The Executive Officer shall approve or disapprove a manufacturer's quality control procedures within 30 days of the submission of the procedures and the document(s) containing the demonstration described above. Any changes to the quality control procedures shall be reported to the ARB and approved by the Executive Officer prior to their implementation. Reports should be sent to the Chief, Mobile Source Operations Division, Air Resources Board, 9528 Telstar Avenue, El Monte, CA 91731, no later than July 15th and January 15th for each production year.

If the Executive Officer does not approve the manufacturer's quality control procedures, the ARB may randomly select and test production units for enforcement purposes. The ARB also reserves the right to inspect facilities and records. Failure to meet the stated requirements may result in violations of Vehicle Code Sections 27156 or 38391 and 13, CCR, Section 2472 and subject the manufacturer to recalls pursuant to this paragraph and Section 2225, Title 13, CCR, and other penalties as provided by law, including those provided in Business and Professional Code Sections 17200 and 17500.

If the first selected production converter fails to meet the original certification standards, the manufacturer may submit a test plan to further evaluate the failed converter model based upon a statistical analysis or the manufacturer may submit a plan-of-action to correct the problem. The test plan or plan-of-action shall be submitted to the ARB within 30 days after failure of a converter model, and shall be approved by the Executive Officer prior to implementation. All quality audit data, as well as production quantity data for each converter model, must be submitted to the ARB for review on a semi-annual basis.