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Agency Secretary

# Air Resources Board

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Chairman

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**Gray Davis**  
Governor

August 21, 2003

MSO # 2003-04

**TO:** ALL SPARK-IGNITION MARINE ENGINE (SIME) MANUFACTURERS  
ALL INBOARD AND STERNDRIVE SIME MANUFACTURERS  
ALL OTHER INTERESTED PARTIES

**SUBJECT:** CERTIFICATION GUIDELINES FOR 2001 MODEL-YEAR (MY) AND  
LATER OUTBOARD/PERSONAL WATERCRAFT AND 2003 MY AND  
LATER INBOARD/STERNDRIVE SPARK-IGNITION MARINE ENGINES.

In 1998, the Air Resources Board (ARB or Board) adopted emission regulations and test procedures applicable to Spark-Ignition Marine Engines (SIMEs) used in outboard and personal watercraft (OB/PWC) applications produced on or after January 1, 2001. In July 2001, the Board amended the SIME standards and test procedures to include 2003 and later model year inboard and sterndrive (I&S) SIME engines.

Enclosed are the guidelines for preparing and submitting applications for certification of SIMEs. Applications prepared following these guidelines will permit an expedited review by the Air Resources Board's (ARB's) staff. New SIMEs are not legal for sale and use in California until they are certified by the ARB. It is incumbent on the manufacturer to make sure that it has received the Executive Order (EO) for an engine family (EF) before shipping engines into California. Violations of the certification requirements will subject the engine manufacturer and selling dealers to enforcement actions by the state. These guidelines include the following parts.

- Chapter I: Certification Overview
- Chapter II: General Instructions
- Attachment 1: Certification Summary Sheet and Supplemental Information Formats
- Attachment 2: Certification Database

For an engine family to be certified by the ARB, the manufacturer's application package must include the following elements.

1. Three-ring binder (appropriate size)
2. Cover Letter
3. Certification Summary Sheet
4. Supplemental Information
5. Certification Database. This must be transmitted electronically to the manufacturer's assigned ARB Certification Section staff.
6. The federal application for certification for the subject engine family submitted to the U.S. Environmental Protection Agency.

An electronic copy of this mailout can be found on the ARB's internet website at <http://www.arb.ca.gov/msprog/marine/marinectp/marinectp.htm>.

Should you have further questions on this matter, please contact Mr. Kumar Muthukumar, Manager, Off-road Certification/Audit Section, at (626) 575-7040, or by e-mail at [cmuthuku@arb.ca.gov](mailto:cmuthuku@arb.ca.gov).

This mailout supersedes mailout #MSO 2000-09 dated August 22, 2000.

Sincerely,

/s/

Allen Lyons, Chief  
Mobile Source Operations Division

Enclosure

### REFERENCES

References 1 through 13 below and other related marine engine regulatory and certification documents are accessible through the ARB's internet website at <http://www.arb.ca.gov/msprog/marine/marinectp/marinectp.htm>. Reference 14 may be accessed at <http://www.arb.ca.gov/regact/levii01/2001.pdf>.

1. Title 13, California Code of Regulations (13 CCR), section 2440. (Applicability)
2. 13 CCR, section 2111-2140, 2147 (In-Use Compliance Testing and Recall)
3. 13 CCR, section 2441. (Definitions)
4. 13 CCR, section 2442. (Emission Standards)
5. 13 CCR, section 2443.1. (Emission Control Labels)
6. 13 CCR, section 2443.2. (Environmental Labels)
7. 13 CCR, section 2443.3. (Consumer Labels)
8. 13 CCR, section 2444.1 (In-Use Compliance Testing and Recall)
9. 13 CCR, section 2444.2 (On-Board Diagnostics)
10. 13 CCR, section 2445.1. (Defects Warranty Statement)
11. 13 CCR, section 2445.2. (Emission Control Warranty Statement)
12. 13 CCR, section 2446. (Production-Line Testing and Selective Enforcement Auditing)
13. California Exhaust Emission Standards and Test Procedures for 2001 Model Year and Later Spark-Ignition Marine Engines (Test Procedures), amended July 26, 2001 (Emission Test Procedures and Certification Procedures)
14. California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles, amended December 27, 2000. (for Test Fuel Purposes)

## SIMES

### CHAPTER I

### CERTIFICATION OVERVIEW

Starting from the 2001 model-year for OB/PWC and 2003 model-year for I&S, new SIMES must be certified for emission compliance by the Air Resources Board (ARB) before the engines are legal for sale and use in California. The **Executive Orders** certifying these engines are valid for only **one model-year** of production. **New Executive Orders for continued production in each succeeding model year** must be obtained from ARB. Selling an engine before the engine receives ARB certification will subject the engine manufacturer and the selling dealers to ARB **enforcement actions** as authorized by state laws.

SIMES are grouped into **engine families** for certification and all related implementation purposes (e.g., quality audit, recall). The guidelines for grouping engines in the same engine family are outlined in the Test Procedures, Part I, Section 17. An engine family includes engine models that share similar engine design and emission control features such that these engine models can be expected to exhibit similar emission performance. The ARB's emission control program for SIMES can be roughly divided into **three phases**: Pre-Production with certification, running changes and field fixes; In-Production with quality audit testing; and Post-Production with in-use testing.

#### 1. CERTIFICATION

- Certification Process
- Determining the Applicable Emission Standard
- Durability Testing and Determining DFs
- Certification Testing
- Data Carryover and Carryacross
- Running Changes and Field Fixes
- On-Board Diagnostics-Marine (applicable to 2007 and later MY I&S)

##### a. Certification Process

Where applicable, the manufacturer must determine the useful-life emission deterioration factor (**DF**), additive or multiplicative, for the engine family to obtain ARB certification for each engine family. This DF is applied to the emission result from the engine family's official certification engine to demonstrate that the deteriorated (i.e., projected useful-life) emission rate complies with the applicable emission standard. The ARB may direct the manufacturer to conduct a **retest** if the original test result indicates marginal compliance. Any **anti-tampering device** that will be installed on production engines for protection against unauthorized adjustment of emission-related adjustable parameters must be approved by ARB. The manufacturer's format for the **certification label**, consumer label ("**hang tag**" label) and environmental label ("**stars**" label), and the locations where the labels are affixed to each production engine must be approved by the ARB. The manufacturer's **emission warranty statement** provided with each production engine must also be approved by ARB.

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The manufacturer must submit to ARB an **application for certification** containing all the required information and test data in the **ARB-specified format**. The ARB is required to approve or disapprove an application within **90 days** after receipt of the **complete application**; the normal processing time is about **4 to 6 weeks**. However, manufacturers must make sure they receive an EO for each EF before shipping engines into California to avoid ARB **enforcement actions**. To **expedite the certification approval**, requests for ARB approval of anti-tampering devices, labels, the emission warranty statement, and any **modification to the test procedures** may be submitted in advance of the application.

### b. Determining the Applicable Emission Standard

#### (i) Outboard and Personal Watercraft Engines

For each engine family, the manufacturer must decide the **applicable emission standard** in one of two ways. For **direct compliance**, the applicable emission standard is specified by regulation based on the sales-weighted average rated power of all engines produced for the engine family. At the time of certification, an estimated standard is determined based on the engine family's manufacturer-projected production volume and engine-model mix. At the end of the model-year production, the final, applicable emission standard will be determined based on the actual production number and product mix.

For **corporate average compliance**, the manufacturer will specify, subject to certain limitations, a family emission limit (**FEL**) for each engine family. The FEL is the applicable emission standard for all engines in the family. The **corporate-average emission value**, which is weighted by the FEL, production volume, and sales-weighted average rated power of each engine family that participates in the corporate compliance method, must not exceed the applicable **corporate-average standard** which is determined by regulation based on the sales-weighted average rated power of all participant engine families. Engines for **outboard** and **personal watercraft** must be in **separate corporate average compliance plans**.

#### (ii) Inboard and Sterndrive Engines

For each engine family, the manufacturer must decide the **applicable emission standard** in one of two ways. For **direct compliance**, the applicable emission standard, as specified by regulation, must be met by all engines produced for each engine family.

For **corporate average compliance**, the manufacturer will specify a family emission limit (**FEL**) for each engine family. The FEL is the applicable emission standard for all engines in the family. The **corporate-average emission value**, which is weighted by the FEL and projected production volume or actual sales of each engine family that participates in the corporate compliance method, must not exceed the applicable standard as specified by regulation for the MY.

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### c. Durability Testing and Determining DFs

The DF is a measure of emissions deterioration over the family's useful life. DFs are determined through manufacturers' **durability testing**. The manufacturer must determine the deterioration factor for each engine family and pollutant based preferably on emissions test data. However, engineering judgement can also be used. Test methods and engineering arguments are reviewed for validity by certification staff. For personal watercraft and outboard spark-ignition marine engines, this deterioration factor must be based on the designated useful life of the engine family. For inboard and sterndrive spark-ignition marine engines, the deterioration factor must be based on a designated test period of 480 hours.

A manufacturer should submit its durability test plan for ARB approval prior to conducting the testing to avoid rejection of the resulting DF.

The following is a summary of the elements of an acceptable durability test program. A prototype **durability data engine** in the configuration expected to exhibit a **high deterioration rate** (e.g., the hottest engine conditions and catalyst temperature) is run on a representative **operating schedule** and **commercially available fuels** to accumulate service hours that age the engine and its emission controls up to the equivalent of its useful life. Emission-related **scheduled maintenance** as permitted in regulations may be performed. **Unscheduled maintenance** may be performed only with prior ARB approval. During service accumulation, engine emissions are **periodically measured** using the regulation-specified test fuel and test procedures to establish the trend line that will be used to determine the DF. Depending on the type of anti-tampering device used, the ARB may specify the **settings of adjustable parameters** for the purpose of conducting the durability test. **Whole-engine aging** (normal or accelerated) and **component bench aging** are acceptable methods for service accumulation.

For SIMES not utilizing aftertreatment technology (e.g., catalytic converters, exhaust gas recirculation), data from each pollutant (combined HC+NO<sub>x</sub>, and CO) are plotted against the service accumulation hours and a deterioration line is fitted with the least-squares linear regression method to determine the DF for each of these pollutants. The DFs for SIMES not utilizing aftertreatment technology are additive and are determined as the calculated emission value (carried out to two additional significant figures as compared to the standard) at the end of the durability period minus the calculated emission value at the "0-hour" test point. If the DF is less than zero, a value of zero is to be used. Each DF is then added to the corresponding exhaust emission result from the test engine to determine the certification emission value for that pollutant. The deterioration lines or test points must not exceed the applicable emission standards or FELs, or the data will not be accepted for DF determination. Alternatively, a manufacturer may choose to determine DFs for HC and NO<sub>x</sub> separately, add each DF to each exhaust emission result to obtain the deteriorated emission values, and then sum up the deteriorated emission values to obtain the HC+NO<sub>x</sub> certification value. For the purpose of consistency, a manufacturer should use one method of determining DFs for all of its engine families.

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For SIMES utilizing aftertreatment technology (e.g., catalytic converters, exhaust gas recirculation), data from each pollutant (combined HC+NO<sub>x</sub>, and CO) are plotted against the service accumulation hours and a deterioration line is fitted with the least-squares linear regression method to determine the DF for each pollutant. The DFs for SIMES utilizing aftertreatment technology are multiplicative and are determined as the calculated emission value (carried out to two additional significant figures as compared to the standard) at the end of the durability period divided by the calculated emission value at the "0-hour" test point. If the DF is less than one, a value of one is to be used. Each exhaust emission result from the test engine is then multiplied by each DF to determine the certification emission value for that pollutant. The deterioration lines or test points must not exceed the applicable emission standards or FELs, or the data will not be accepted for DF determination. Alternatively, a manufacturer may choose to determine DFs for HC and NO<sub>x</sub> separately, multiply each exhaust emission result by each DF to obtain the deteriorated emission values, and then sum up the deteriorated emission values to obtain the HC+NO<sub>x</sub> certification value. For the purpose of consistency, a manufacturer should use one method of determining DFs for all of its engine families.

### d. Certification Testing

Close to production time, an **emission data engine** (a prototype engine with **production-intent calibrations**) that is expected to exhibit the **worst emissions** (e.g., highest specific fuel rate, coolest catalyst temperature) is run according to the manufacturer's **break-in** procedure to stabilize the engine's emissions. An emission test is then conducted using the specified test fuel and test procedure. Depending on the type of anti-tampering device used, the ARB may specify the **settings of the adjustable parameters** for the purpose of conducting the certification test. For the engine family to be certified, its **certification emission level**, which is the emission data engine's test result adjusted (i.e., added or multiplied) by the DF, must not exceed the applicable emission standard or FEL.

### e. Data Carryover and Carryacross

Subject to ARB approval, durability data and/or certification emission data may be **carried over**, in lieu of new tests, to subsequent model year engine families, provided no changes have been made that would result in the selection of a new durability engine or emission data engine. Also, subject to ARB approval, the durability data and/or certification emission data may be **carried across**, in lieu of new test data, to a different engine family in the same or different model year if it is adequately demonstrated that the DF and/or emission data are representative of the new engine family.

### f. Running Changes and Field Fixes

Any factory change to engines during model-year production must be approved by ARB via a **running change** request. Any change to engines implemented after the assembly line (e.g., at factory warehouses, distribution centers, dealers) must be approved by ARB via a **field fix** request. A field fix request typically occurs after model-year production has

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ended. Running changes and field fixes not approved by ARB will render affected engines uncertified and subject the manufacturer to ARB enforcement actions.

### 2. QUALITY AUDIT (OB/PWC only)

During model-year production, manufacturers are required to conduct quality audit (QA) tests of production engines to show the engine family's compliance with the emission standard. A manufacturer must use one of two QA options, the Cumulative Sum (**CumSum**) or **QA (1%)** method. Once selected, the applicable QA method must be applied to **all** of the manufacturer's engine families during the model year. Changing from the selected QA method to another anytime during the model year will not be allowed. A manufacturer's QA **sampling plan** and **test procedure** must be approved by ARB prior to the start of engine production. **Quarterly reports** of the QA test results must be submitted to ARB in a specified format and within specified time limits. Specified format and guidance to manufacturers regarding the preparation and submittal of quarterly production line testing reports can be found in Manufacturer's Advisory Correspondence (**MAC**) #2000-04. Copy of the MAC (**MAC 00-04**) may be downloaded from the ARB's web site at <http://www.arb.ca.gov/msprog/marine/marinectp/marinectp.htm>.

### 3. SELECTIVE ENFORCEMENT AUDIT TESTING

Beginning in 2001 MY production for OB/PWC and 2003 MY production for I&S, ARB may conduct selective enforcement audit (SEA) testing of production engines to verify an engine family's compliance with emission standards.

For questions or more information regarding certification, QA, or SEA testing, please **contact** your **assigned staff person** or Mr. Kumar Muthukumar, Manager, Off-road Certification/Audit Section, at (626) 575-7040, or by e-mail at [cmuthuku@arb.ca.gov](mailto:cmuthuku@arb.ca.gov).

### 4. IN-USE TESTING

#### (a) Outboard and Personal Watercraft Engines

Manufacturers of OB/PWC engines are subject to in-use testing to demonstrate the continued compliance of engines. The **ARB will select** certain engine families for in-use testing. Upon ARB notification, the **manufacturer shall procure and test** in-use engines in accordance with the test procedures (References #1 and #8). To avoid rejection of the gathered in-use data, a manufacturer should submit its **in-use test plan** for ARB approval prior to conducting the in-use testing. If the in-use test results exceed the applicable emission standard, the manufacturer will be required to implement **remedial actions** approved by ARB.

#### (b) Inboard and Sterndrive Engines

Starting in 2009, manufacturers of I&S engines are subject to in-use testing to demonstrate the continued compliance of their engines.



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For more information on in-use testing, please **contact** Mr. John Urkov, Chief, In-Use Programs Branch, at (626) 575-6814, or by e-mail at [jurkov@arb.ca.gov](mailto:jurkov@arb.ca.gov).

### 5. ON-BOARD DIAGNOSTICS (I&S only)

To keep emission control systems working at optimum levels of efficiency, I&S engines meeting the 5.0 g/kW-hr HC+NO<sub>x</sub> emission in 2007 and later model years are required to be equipped with on-board diagnostics marine (OBD-M) systems. OBD-M systems will monitor the catalyst, oxygen sensor, fuel system, and comprehensive components (sensor and solenoids) for proper operation in-use. On-board engine malfunction detection system requirements can be found in 13 CCR, section 2444.2.

These instructions provide guidance regarding the preparation, submission and revision of certification applications for 2001 and later OB/PWC and 2003 and later I&S SI marine engines. Only essential information for certification is required in this format. Other information required by the test procedures (e.g., test engine build records, test and maintenance records, etc.) must be maintained by the manufacturer and made available to the ARB within 30 days upon request. An application submitted in accordance with these instructions will enable an expedited review and approval by the ARB. All revisions to the application must be submitted to the ARB for approval.

**1. WHERE TO SUBMIT APPLICATION FOR CERTIFICATION**

All certification-related applications and correspondence should be forwarded to:

Mr. Allen Lyons, Chief  
Mobile Source Operations Division  
Air Resources Board  
9480 Telstar Avenue, Suite 4  
El Monte, California 91734-2301

**2. LETTER OF INTENT**

A letter of intent should be submitted to the ARB in advance of submission of the first application for certification for the model year. The letter of intent should list planned engine families, the projected dates when the applications will be submitted, and the dates by which the Executive Orders are needed. Any certification or testing issues that may delay the certification process of any engine family may be included in the letter of intent. Updates to the manufacturer's certification plan should be submitted in a timely manner. ARB staff uses the information provided in the letter of intent to plan ahead for the certification year and to resolve issues in advance so that the manufacturer's certification schedule can be met.

**3. COVER LETTER**

A cover letter, signed by the manufacturer's authorized representative, must accompany each engine family application. The cover letter should recap highlights about the engine family, such as the applicable standard or FEL, the number of eligible stars, the use of a modified test procedure, and anticipated start date of production.

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The following statements of compliance must be provided in the letter:

- a) Conformance with the general standards regarding no increase in emissions or unsafe conditions as stated in section 5 of the “California Exhaust Emission Standards and Test Procedures for 2001 Model Year and Later Spark-Ignition Marine Engines”, adopted July 26, 2001.
- b) Conformance with the specifications for the emission control label, and consumer/environmental and hang tag labels as stated in 13 CCR, Sections 2443.1 through 2443.3.
- c) The test engine for which data have been submitted has been tested in accordance with the applicable test procedures, that it meets the requirements of such tests, and that, on the basis of such tests, it conforms to the requirements of this Part (i.e., Reference #13).

## 4. LABELING

The engine manufacturer is required to submit three different labels for each engine to the ARB for review and approval of format, content and location. The proposed locations must be shown by either a drawing or photograph. Detailed written explanations of the label locations may also be acceptable. Manufacturers may submit samples for approval in advance of the actual certification application to prevent any certification delay.

The first label is the emission control label, or engine label. The label must contain all the information enumerated in 13 CCR, section 2443.1(c)(4). If the engine label will be obscured by the OEM’s equipment or housing, a supplemental label must be provided for affixing on the exterior of the equipment. It must contain the same information as the engine label except for manufacture-date, which may be omitted. However, if the manufacture-date is not included on the supplemental label, it must be stamped or indicated elsewhere on the exterior of the equipment.

The second label is the consumer/environmental label. This label is required for all SIMEs that meet the Tier 1, 2, 3 or 4 standards. These labels may be used by parks and waterway agencies to control access of these marine watercraft based on environmental concerns. Engines are denoted as one-, two-, three- or four-star, with four-star being the lowest emitting; the specific requirements of this label are provided in 13 CCR, section 2443.2

The third label is a nonpermanent label (e.g., hang tag) that explains the cleanliness of the one-, two-, three-, and four-star ratings on the environmental label. The suggested language for this label is provided in 13 CCR, section 2443.3 (b). For 2003 and later model year, manufacturers of inboard and sterndrive SIMEs will be allowed to use an alternative hang tag design specified in Appendix A of Manufacturers Advisory Correspondence (MAC) 2003-01 that accommodates the application of 1-star and 2-star

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labels to these engines. The only differences between these designs are some amendments to the one-star, two-stars, and three-stars language on the back of the tag. Although not a requirement, manufacturers of OB/PWC SIMEs may choose to use the design in MAC 2003-01 in order to standardize the hang tag design for all categories of SIMEs. For the purpose of consistency, a manufacturer must use the same hang tag design on all of its engine families.

### **5. WARRANTY**

A copy of the engine manufacturer's emission warranty statement that will be provided to the end-users must be submitted for ARB review and approval. The warranty statement must be completed as specified in 13 CCR, sections 2445.1 and 2445.2. Manufacturers may submit their proposed warranty statement for approval in advance of the actual certification application to prevent any certification delay.

### **6. TEST PROCEDURES**

The test equipment provisions and emission test procedures for SIME engines are identical between the ARB and the United States Environmental Protection Agency (U.S. EPA).

### **7. MODIFIED TEST PROCEDURES**

Any modifications to the prescribed test equipment and/or test procedures due to unique engine designs, laboratory equipment arrangements, facility limitations, etc. must be approved by the Executive Officer and described in the application. The use of unapproved test equipment or procedures can result in rejection of generated test data.

### **8. ADJUSTABLE PARAMETERS AND ANTI-TAMPERING DEVICES**

If a test engine has a parameter that can be adjusted in a way that can significantly affect emissions, it will be tested at the possible extremes of the adjustment (i.e., maximum rich and lean settings). Samples of a manufacturer's proposed anti-tampering measure, preferably as implemented on the carburetor or engine as applicable, to prevent unauthorized adjustments should be submitted in advance of the application to the ARB for approval. All adjustable parameters, sealed and unsealed, and the corresponding ARB approval number must be reported in the application. If the parameter or method of tamper-resistance is subsequently modified, a new ARB approval will be required.

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### 9. CERTIFICATION EMISSION TEST FUEL

The fuel for emission testing must meet the specifications in the test procedures to reduce emission variations due to fuel effects. Testing with unauthorized fuel will result in rejection of the test results.

- a. Gasoline. Three test fuels are allowed.
  - i. Indolene Clear. This certification gasoline is specified in the Code of Federal Regulations, Title 40, Part 86, section 113-91(a)(1). [40 CFR 86.113-94(a)(1)].
  - ii. California Phase 2 Gasoline (Cleaner Burning Gasoline). The specifications of this certification gasoline are provided in the on-road test procedures (Reference #14). This gasoline may be used as an option to Indolene Clear.
  - iii. Clean Air Act Baseline. This is the default fuel allowed by the U.S. EPA. The specifications for this fuel can be found in Table 8-1 of the Test Procedures (Reference #14).
- b. Gaseous Fuels (LPG, Propane, CNG, LNG): The gaseous certification emission-test fuels are referenced in the on-road test procedures (Reference #14). They are listed here for manufacturers' convenience.
  - i. Liquefied Petroleum Gas. All certification emission testing must use the following specifications.
    - a) propane content of 93.5 volume percent +/- 1.0%;
    - b) propene content of 3.8 volume percent +/- 0.5%; and
    - c) butane and heavier components of 1.9 volume percent +/- 0.3%.
  - ii. Natural Gas. All certification emission testing must use the following specifications:
    - a) methane content of 90.0 mole percent +/- 1.0%;
    - b) ethane content of 4.0 mole percent +/- 0.5%;
    - c) C<sub>3</sub>-and-higher hydrocarbon content of 2.0 mole percent +/- 0.3%;
    - d) oxygen content of 0.5 mole percent maximum;
    - e) inert gas (sum of CO<sub>2</sub> and N<sub>2</sub>) content of 3.5 mole percent +/- 0.5%.

### 10. AMENDMENTS TO THE APPLICATION

Any revisions to the application due to typographical errors, corrections, running changes or field fixes, or new test data and information must be submitted to the ARB. If the change affects the Certification Summary form and/or the Model Summary form, the revised forms will have to be completely filled and submitted. For the other parts of the application package, only the revised information on the affected application pages needs to be submitted, together with the following for identification purposes:

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- Manufacturer Name
- Model Year
- Engine Family
- Process Code
- Engine Displacement
- Comments Fields (describing the update or change)
- The field that has been changed or corrected.

### 11. RUNNING CHANGES AND FIELD-FIXES

Any factory change to the engines during the model-year production must be approved by ARB via a manufacturer's submitted running change request. Any change to the engines implemented after leaving the assembly line (e.g., at factory warehouses, distribution centers, dealers) must be approved by ARB via a manufacturer's submitted field fix request; a field fix request typically occurs after the model-year production has ended. Running changes and field fixes not approved by ARB will render affected engines uncertified and subject the manufacturer to ARB enforcement actions. If the change affects an emission-related part or results in a new "worst-case" test engine, new test data or engineering evaluations will be required to demonstrate that the engine family will remain in compliance. Only the affected pages and information fields of the application need to be submitted.

### 12. FAMILY EMISSION LIMIT (FEL) CHANGES

Subject to ARB approval, an engine manufacturer may recertify an engine family during the model year to change the affected FEL. The new FEL will be applied to all engines in the family. Frequent changes to FELs to meet emission requirements (referred to as "gaming" with FEL) will not be permitted.

### 13. CONFIDENTIALITY

The ARB will deem the engine manufacturer's projected California sales, production periods and catalytic converter composition (precious metal ratio and loading) confidential. Manufacturers may be required to justify confidential designations for other certification information.

**Attachment 1:**

**Certification Summary Sheet: (1 page)**

- Sample as printed from entries that were entered for the Access 97 Certification Database Form (see Attachment 2).

**Supplemental Information Formats (10 pages)**

**Model Year:** \_\_\_\_\_  
**Manufacturer Name:** \_\_\_\_\_  
**Engine Family:** \_\_\_\_\_  
**SI MARINE ENGINE SUPPLEMENTAL INFORMATION**

**Page:** \_\_\_\_\_  
**Issued:** \_\_\_\_\_  
**Revised:** \_\_\_\_\_  
**E.O.#:** \_\_\_\_\_

S01. CARBURETOR Yes \_\_\_ No \_\_\_

- a. Number of Carburetors: \_\_\_\_\_
- b. Number of Barrels per Carburetor: \_\_\_\_\_
- c. Feedback Control: Yes \_\_\_ No \_\_\_
- d. Idle Circuit: Yes \_\_\_ No \_\_\_
- e. Fast Idle Circuit: Yes \_\_\_ No \_\_\_
- f. Other Subsystems (specify): \_\_\_\_\_
- g. Used in previous/other engine model: No \_\_\_ Yes \_\_\_  
If yes, last model year used: \_\_\_\_\_

S02. FUEL INJECTION: Yes \_\_\_ No \_\_\_

- a. Type (e.g., TBI, DGI, MPI, SMPI): \_\_\_\_\_
- b. Feedback Control: Yes \_\_\_ No \_\_\_
- c. Point of Injection (e.g., manifold, cylinder, pre-chamber, throttle body): \_\_\_\_\_
- d. Used in previous/other engine models: No \_\_\_ Yes \_\_\_ If yes, last year used: \_\_\_\_\_

S03. CRANKCASE CONTROL

- a. Type (e.g., PCV valve, uncontrolled flow, crankcase scavenging for 2-stroke engines): \_\_\_\_\_
- b. Routing: Air Cleaner \_\_\_ Intake Manifold \_\_\_ Inlet Ports (2-Stroke Engines) \_\_\_ Other (specify) \_\_\_

S04. OXYGEN SENSOR: Yes \_\_\_ No \_\_\_

- a. Type: Heated \_\_\_ Unheated \_\_\_ Other (specify) \_\_\_\_\_
- b. Location: Port \_\_\_ Exhaust Manifold \_\_\_ Other (specify) \_\_\_\_\_
- c. Used in previous/other engine models: No \_\_\_ Yes \_\_\_ If yes, last year used: \_\_\_\_\_

S05. SECONDARY AIR INJECTION: Yes \_\_\_ No \_\_\_

- a. Type: Pump \_\_\_ (AIR) Pulsed \_\_\_ (PAIR)
- b. Point of Injection: Port \_\_\_ Exhaust Manifold \_\_\_ Other (specify) \_\_\_\_\_
- c. Method of Modulation: Vacuum \_\_\_ Solenoid \_\_\_
- d. Sensed Parameters (check all applicable): Coolant Temp \_\_\_ Engine RPM \_\_\_ MAP \_\_\_  
Throttle Position \_\_\_ Other (specify) \_\_\_\_\_
- e. Used in previous/other engine models: No \_\_\_ Yes \_\_\_ If yes, last year used: \_\_\_\_\_

S06. EXHAUST GAS RECIRCULATION (EGR): Yes \_\_\_ No \_\_\_

- a. Sensed Parameters (check all applicable): Coolant Temp \_\_\_ Engine RPM \_\_\_ MAP \_\_\_  
Throttle Position \_\_\_ Other (specify) \_\_\_\_\_
- b. Method of Modulation: Vacuum \_\_\_ Solenoid \_\_\_
- c. Used in previous/other engine models: No \_\_\_ Yes \_\_\_ If yes, last year used: \_\_\_\_\_

S07. ADJUSTABLE PARAMETERS AND ANTI-TAMPERING MEASURES

Parameter	Adjustable Range (or N/A)	Tamper Resistance Method (or N/A)	Approval Reference



Model Year: \_\_\_\_\_  
Manufacturer Name: \_\_\_\_\_  
Engine Family: \_\_\_\_\_  
**SI MARINE ENGINE SUPPLEMENTAL INFORMATION**

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Revised: \_\_\_\_\_  
E.O.#: \_\_\_\_\_

S08. CATALYTIC CONVERTER: Yes \_\_\_\_\_ No \_\_\_\_\_

- a. Type/Number/Arrangement (e.g., TWC, OC, 2TWC for 2 parallel, TWC-2 for 2 in series): \_\_\_\_\_
- b. Location (e.g., close coupled, exhaust manifold, muffler): \_\_\_\_\_
- c. Catalyst Manufacturer.: \_\_\_\_\_
- d. Substrate: (i) Volume: \_\_\_\_\_ cc (ii) Construction: Pellet \_\_\_\_\_ Honeycomb \_\_\_\_\_  
Number of cells: \_\_\_\_\_ (per cm<sup>2</sup>)  
(iii) Composition: Ceramic \_\_\_\_\_ Metallic \_\_\_\_\_ (iv) Containment Method: Wire mesh \_\_\_\_\_ Other (specify) \_\_\_\_\_
- e. Active Material:

Composition (Pt, Pd, Rh): _____ Ratio: _____ Loading (g/L) _____
--

**CONFIDENTIAL**

S09. ON-BOARD DIAGNOSTICS: Yes \_\_\_\_\_ No \_\_\_\_\_

- a. Monitored Parameters (check all applicable): Catalyst \_\_\_\_\_ Oxygen Sensor \_\_\_\_\_ Fuel System \_\_\_\_\_  
Misfire \_\_\_\_\_ Other (specify) \_\_\_\_\_

S10. PROJECTED SALES AND PRODUCTION PERIOD

**CONFIDENTIAL**

- a. Projected California Annual Sales (units): \_\_\_\_\_ Projected 50 State Sales (units): \_\_\_\_\_
- b. Estimated Production Period: Start Date: \_\_\_\_\_ End Date: \_\_\_\_\_
- c. Estimated Introduction into Commerce Date: \_\_\_\_\_

Model Year: \_\_\_\_\_  
 Manufacturer Name: \_\_\_\_\_  
 Engine Family: \_\_\_\_\_

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**SI MARINE ENGINE SUPPLEMENTAL INFORMATION**

S11. MODEL SUMMARY (Use an asterisk (\*) to identify worst-case engine model used for certification testing.)

S12. Engine Model	S13. Engine Code	S14. Sales Codes (Check ALL appropriate)			S15. Eng. Displ. (cc)	S16. Rated Power (kW)	S17. Rated Speed (RPM)	S18. Peak Torque (N-m)	S19. Peak Torque Speed (RPM)
		Calif. Only	49-State	50-State					

**Model Year:** \_\_\_\_\_  
**Manufacturer Name:** \_\_\_\_\_  
**Engine Family:** \_\_\_\_\_  
**SI MARINE ENGINE SUPPLEMENTAL INFORMATION**

**Page:** \_\_\_\_\_  
**Issued:** \_\_\_\_\_  
**Revised:** \_\_\_\_\_  
**E.O.#:** \_\_\_\_\_

S20. EMISSION-RELATED PART NUMBERS (Part numbers as stamped on the component, not the stock or inventory numbers, should be listed here.)

S12. Engine Model					
<b>Fuel System:</b>					
Carb/Mixer Assy.					
Fuel Injector					
Fuel Pump					
ECM					
Pressure Regulator					
Oxygen Sensor					
Other (specify)					
<b>Intake System:</b>					
Air Cleaner Element					
Intake Manifold					
Turbocharger					
Supercharger					
Charge Air Cooler					
Other (specify)					
<b>Ignition System:</b>					
Spark Plug					
Ignition Coil					
Ignition Control Valve Module					
Distributor					
Other (specify)					
<b>EGR:</b>					
EGR Valve Assembly					
Vacuum Control Valve					
<b>Air Injection</b>					
Control Valve					
Check Valve					
Solenoid Valve					
<b>Aftertreatment System:</b>					
Catalyst					
Exhaust Manifold					
<b>Crankcase System:</b>					
PCV Valve					

Model Year: \_\_\_\_\_  
Manufacturer Name: \_\_\_\_\_  
Engine Family: \_\_\_\_\_  
**SI MARINE ENGINE SUPPLEMENTAL INFORMATION**

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**S21. LABELING:**

- a. Emission label format approved? No \_\_\_ Yes \_\_\_ If yes, reference approval: \_\_\_\_\_  
Sample label attached? No \_\_\_ Yes (put label in #S23) \_\_\_
  
- b. Environmental label format approved? No \_\_\_ Yes \_\_\_ If yes, reference approval(s): \_\_\_\_\_  
Sample label attached? No \_\_\_ Yes (put label in #S23) \_\_\_
  
- c. Environmental hangtag format approved? No \_\_\_ Yes \_\_\_ If yes, reference approval(s): \_\_\_\_\_  
Sample hangtag attached? No \_\_\_ Yes (put hangtag in #S23) \_\_\_

**S22. WARRANTY:** Emission warranty approved? No \_\_\_ (Provide full warranty statement in #S23)

Yes \_\_\_ (Reference approval: \_\_\_\_\_ )

Have any changes been made since the last approval? No \_\_\_ Yes \_\_\_ If yes, provide an explanation of the changes:

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Model Year: \_\_\_\_\_  
Manufacturer Name: \_\_\_\_\_  
Engine Family: \_\_\_\_\_  
**SI MARINE ENGINE SUPPLEMENTAL INFORMATION**

Page: \_\_\_\_\_  
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S23. ADDITIONAL INFORMATION AND COMMENTS

S24. CORPORATE AVERAGE PLAN  
 SAMPLE FORMAT

Equipment Type (check one): **Outboard**  **Personal Watercraft** \_\_\_\_\_

**CONFIDENTIAL**

ABC Marine Co.  
 Certification Plan and Estimated Production Volumes  
 2001 Model Year SI Marine Engines

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Engine Family	Models	Rated Power (kW)	Estimated Production Volume (Units)		HC+NOx Family Emission Limit (g/kW-hr)	Family Sales-Weighted Power (kW) $\Sigma [(3) \times (5)] / \Sigma (5)$	(4) x (7)	(4) x (6) x (7)
			Family	Model				
YXZM.123ABC			30		140.00	9.9	297.0	41580
	711K	4.3		10				
	723B	10.1		10				
	747A	15.4		10				
YXZM.234DEF			58		125.00	25.7	1490.6	186325
	850B	16.7		13				
	850C	28.3		45				
YXZM.345GHJ			39		35.00	36.2	1411.8	49413
	345X	30.0		23				
	450W	45.2		16				
YXZM2.00KLM			54		15.00	96.9	5232.6	78489
	200J	96.9		54				
<b>TOTALS:</b>			<b>181</b>				<b>8432.0</b>	<b>355807</b>

- SALES-WEIGHTED AVERAGE POWER (P) OF ALL ENGINE FAMILIES =  $\Sigma [(4) \times (7)] / \Sigma (4) = 8432.0/181 = 46.6$  Kw
- ESTIMATED CORPORATE AVERAGE EMISSION VALUE =  $\Sigma [(4) \times (6) \times (7)] / \Sigma [(4) \times (7)] = 355807/8432.0 = 42.20$  g/kW-hr
- ESTIMATED CORPORATE AVERAGE STANDARD =  $(0.25 \times (151+557/P^{0.9})) + 6.0 = (0.25 \times (151+557/(46.6)^{0.9})) + 6.0 = 48.14$  g/kW-hr

Model Year: \_\_\_\_\_  
 Manufacturer Name: \_\_\_\_\_  
 SI MARINE ENGINE SUPPLEMENTAL INFORMATION

Page: \_\_\_\_\_  
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 E.O.#: \_\_\_\_\_

S24. CORPORATE AVERAGE PLAN

Equipment Type (check one): **Outboard**\_\_\_\_ **Personal Watercraft**\_\_\_\_

**CONFIDENTIAL**

Certification Plan and Estimated Production Volumes

(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)	(9)
Engine Family	Models	Rated Power (kW)	Estimated Production Volume (Units)		HC+NOx Family Emission Limit (g/kW-hr)	Family Sales-Weighted Power (kW) $\Sigma [(3) \times (5)] / \Sigma (5)$	(4) x (7)	(4) x (6) x (7)	
			Family	Model					

1. SALES-WEIGHTED AVERAGE POWER (P) OF ALL ENGINE FAMILIES =  $\Sigma [(4) \times (7)] / \Sigma (4) =$
2. ESTIMATED CORPORATE AVERAGE EMISSION VALUE =  $\Sigma [(4) \times (6) \times (7)] / \Sigma [(4) \times (7)] =$
3. ESTIMATED CORPORATE AVERAGE STANDARD =  $(0.25 \times (151+557/P^{0.9}))+6.0 =$

S25. CORPORATE AVERAGE PLAN  
 SAMPLE FORMAT  
 FOR  
**INBOARD and STERNDRIVE**

**CONFIDENTIAL**

ABC Marine Co.  
 Certification Plan and Estimated Production Volumes  
 2003 Model Year SI Marine Engines

(1)	(2)	(3)		(4)	(5)	(6)
Engine Family	Models	Estimated Production Volume (Units)		HC+NOx Family Emission Limit (g/kW-hr)	(3) x (5)	
		Family	Model			
3YXZM3.00ABC		100			20.00	2000.0
	711K			30		
	723B			30		
	747A			40		
3YXZM4.33DEF		100			14.00	1400.0
	850B			55		
	850C			45		
3YXZM5.00GHJ		200			12.00	2400.0
	345X			120		
	450W			80		
3YXZM8.11KLM		150			11.00	1650.0
	200J			150		
<b>TOTAL</b>		<b>550</b>				<b>7450.0</b>

- ESTIMATED CORPORATE AVERAGE EMISSION VALUE =  $\Sigma [(3) \times (5)] / \Sigma (3) = 7450.0/550 = 13.5 \text{ g/kW-hr}$
- APPLICABLE EXHAUST EMISSION STANDARD (13 CCR, Section 2442) = 16.0 g/kW-hr



S25. CORPORATE AVERAGE PLAN  
 FOR  
 INBOARD and STERNDRIVE

**CONFIDENTIAL**

Certification Plan and Estimated Production Volumes

(1)	(2)	(3)		(4)	(5)	(6)
Engine Family	Models	Estimated Production Volume (Units)		Model	HC+NOx Family Emission Limit (g/kW-hr)	(3) x (5)
		Family				

- ESTIMATED CORPORATE AVERAGE EMISSION VALUE =  $\sum [(3) \times (5)] / \sum [(3)] =$
- APPLICABLE EXHAUST EMISSION STANDARD (13 CCR, Section 2442) =

**Attachment 2:**

**Certification Database**

## CERTIFICATION DATABASE FORM

The database form is an **Access 97** file; the **electronic version** of this form can be **obtained by contacting your assigned ARB staff person** or from the ARB's website at <http://www.arb.ca.gov/msprog/marine/marinectp/marinectp.htm>. An imprint of this database form is enclosed for information purposes (only for hard copy mailings of this guidance). In the Access 97 file, the light blue fields indicate fill-in boxes, dark blue fields indicate pull-down menus and red fields indicate they are "reserved for ARB use only."

After **completing** and **verifying** this database form for each engine family, the manufacturer should (1) print a **hard copy** and submit it as part of the engine family's certification application package, and (2) **electronically send** the certification database information to its assigned Certification staff person.

Below is a list of the information fields that manufacturers must provide in order to complete an application for certification. **Incorrect or missing information will render the application incomplete and result in a certification delay.** The fields below are numbered corresponding to the filled-in numbers that are indicated on the enclosed sample (only for hard copy mailings of this guidance).

Field	Reserved for ARB Use Only	Pull-Down Menu	Fill-In/Describe
1. Model Year		<input checked="" type="checkbox"/>	
2. Application Type		<input checked="" type="checkbox"/>	
3. Manufacturer		<input checked="" type="checkbox"/>	
4. EO No.	<input checked="" type="checkbox"/>		
5. Engine Family Name			12 alphanumeric characters
6. EF Name on Engine Label			12 alphanumeric characters
7. Trade Name			Up to 32 alphanumeric characters
8. Equipment Applications		<input checked="" type="checkbox"/>	
9. Sales Code		<input checked="" type="checkbox"/>	
10. EF CA Projected Sales			Up to 10 numbers
11. EF US Projected Sales			Up to 10 numbers
12. Engine Displace_x			xxxx.xxx (in cc)
13. Highest Power (in kW)			xxx.xxx (in kW)
14. Lowest Power (in kW)			xxx.xxx (in kW)
15. Sales-Weighted Average Power			xxx.xxx (in kW)
16. HC+NOx_Std_CERT			xxx.xxx (Must be equal to or lower than the Star Label's standard.)
17. HC+NOx Standard Type		<input checked="" type="checkbox"/>	
18. Engine Models			Up to 200 alphanumeric characters

Field	Reserved for ARB Use Only	Pull-Down Menu	Fill-In/Describe
19. Star Label Rating		<input checked="" type="checkbox"/>	"0-star" if Tier1<Cert Std.; "1-star" if Tier2<Cert Std.≤Tier1; "2-star" if Tier3<Cert Std.≤Tier2; "3-star" if Cert Std.≤Tier3 "4-star" if Cert Std.≤Tier4
20. Certification Standard		<input checked="" type="checkbox"/>	
21. HC+NOx_Std_STAR			xxx.xxx (in g/kW-hr)
22. Combustion Cycle		<input checked="" type="checkbox"/>	
23. Oil/Fuel Ratio			Up to 10 numerals; enter "N/A" for 4-strokes
24. Engine Type		<input checked="" type="checkbox"/>	
25. Valvetrain		<input checked="" type="checkbox"/>	
26. Valve (Ports)/Cylinder		<input checked="" type="checkbox"/>	
27. Cooling Medium		<input checked="" type="checkbox"/>	
28. # of Cylinders		<input checked="" type="checkbox"/>	
29. Cylinder Arrangement		<input checked="" type="checkbox"/>	
30. Fuel System Configuration		<input checked="" type="checkbox"/>	
31. Operating Fuel		<input checked="" type="checkbox"/>	
32. ECS_Cat		<input checked="" type="checkbox"/>	
33. ECS_o2s		<input checked="" type="checkbox"/>	
34. ECS_fuelsys		<input checked="" type="checkbox"/>	
35. ECS_egr		<input checked="" type="checkbox"/>	
36. ECS_asp		<input checked="" type="checkbox"/>	
37. ECS_air		<input checked="" type="checkbox"/>	
38. ECS_em		<input checked="" type="checkbox"/>	Use "EM" only when CARB (carburetor) fuel system and NA (natural aspiration) are the only other information. Use "*" otherwise.
39. ECS_OBD		<input checked="" type="checkbox"/>	
40. New Durability Testing?		<input checked="" type="checkbox"/>	
41. Durability Carryover EF Name			12 alphanumeric characters; enter "N/A" if #36 is "Yes"
42. Durability Engine Model			Up to 32 characters
43. Durability Engine ID Number			Up to 32 characters
44. Service Accumulation Hours			xxx.xxx (in hours)
45. DF_Type		<input checked="" type="checkbox"/>	
46. xxHC_DF			xx.xxx
47. NOx_DF			xx.xxx
48. xxHC+NOx_DF			xx.xxx (This is optional and for additive DF type only.)
49. CO_DF			xx.xxx

Field	Reserved for ARB Use Only	Pull-Down Menu	Fill-In/Describe
50. CERT_EDE_type		<input checked="" type="checkbox"/>	
51. Emission Carryover Engine Family Name			12 alphanumeric characters; enter "N/A" if #46 is "NEW"
52. Cert_engine model			Up to 32 characters
53. Cert_engine_id			Up to 32 characters
54. Rated Power (kW)			xxx.xxx (in kW)
55. @ Rated_rpm			Up to 5 numerals; no decimals
56. Cert_engine_stabilization_hours			Up to 3 numerals
57. cert_test_date			month/date/year (e.g., 06/19/00 for June 19, 2000)
58. Certification Test Fuel		<input checked="" type="checkbox"/>	
59. Certification Test Procedure		<input checked="" type="checkbox"/>	
60. Certification Test Cycle		<input checked="" type="checkbox"/>	
61. Cert_TP: List all special...			Up to 200 alphanumeric characters
62. HC+NOx: Certification Level			xxx.xx (in g/kW-hr)(Enter level from confirmatory test, if any. If none, enter highest value from all tests.)
63. TEST_SET_x		<input checked="" type="checkbox"/>	
64. HC			xxx.xxx (in g/kW-hr)
65. NOx			xxx.xxx (in g/kW-hr)
66. HC+NOx			xxx.xxx (This is optional and for additive DF only.)
67. CO			xxx.xxx (in g/kW-hr)
68. HC (Deteriorated)			xxx.xxx (in g/kW-hr)
69. NOx (Deteriorated)			xxx.xxx (in g/kW-hr)
70. HC+NOx (Deteriorated)			xxx.xxx (in g/kW-hr)
71. CO (Deteriorated)			xxx.xxx (in g/kW-hr)
72. QA_Procedure		<input checked="" type="checkbox"/>	
73. Remarks			Up to 200 alphanumeric characters
74. Date_issued			month/date/year (e.g., 06/19/00 for June 19, 2000)
75. Date_revision			month/date/year (e.g., 06/19/00 for June 19, 2000)
76. Processed By:	<input checked="" type="checkbox"/>		
77. DATE_PROC	<input checked="" type="checkbox"/>		
78. Review By:	<input checked="" type="checkbox"/>		
79. Review_date	<input checked="" type="checkbox"/>		

