

Spark-Ignition Marine Vessel Evaporative Proposal Workshop



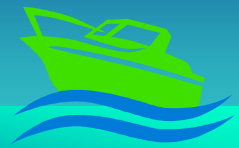
April 28, 2010

Workshop Outline

- ARB Responses to Industry Raised Issues
- Implementation Overview
- Evaporative Emission Design Standards
- Evaporative Emission Performance Standard
- Proposed Test Procedures
- Deck Fill Plate and Fuels Compatibility
- Defects and Warranty Requirements
- Compliance Testing
- Compliance Relief
- Costs Associated with U.S. EPA and ARB Rules
- Request for Canister Control Cost
- Estimated Retail Costs
- Comments and Responses
- Questions and Contact Information

ARB Responses to Industry Raised Issues

- Removed ORVR requirements from proposal
- Delayed implementation until 2014
- Reduced scope of proposal to vessels > 30 kW
- Modified proposal regarding fuel hose permeation standard
- Reduced information required for certification
- Harmonized with U.S. EPA test procedures
- Placed limit on fuels compatibility



Implementation Overview

	MY2012 and MY2013	MY2014 and MY2015	MY2016 and later
≤ 30 kW Vessels	Harmonized with U.S. EPA		
> 30 kW Trailerable Vessels	Harmonized with U.S. EPA	New hose, tank, venting, and FI requirements	More stringent hose requirements
> 30 kW Nontrailerable Vessels	Harmonized with U.S. EPA	New hose, tank, and FI requirements	More stringent hose requirements



Evaporative Emission Design Standards ≤ 30 kW Vessels

- For MY2012 and later, all evaporative emission standards (including fuel cap, fitting, and carbon requirements) and test procedures will be harmonized with U.S. EPA

Evaporative Emission Design Standards for all ≤ 30 kW Vessels

Model Year Effective Date	Fuel Hose Permeation (grams ROG/m ² /day)	Fuel Tank Permeation (grams ROG/m ² /day)	Diurnal Requirement (grams HC/gallon/day)	Fuel Injection or Equivalent (grams HC/hour)
2012 and later	15.0	1.5	0.4	None
Test Procedure	40 CFR §1060.515	40 CFR §1060.520	40 CFR §1060.525	None



Evaporative Emission Design Standards Cont.

> 30 kW Trailerable Vessels

- For MY2012 and MY2013, all evaporative emission standards (including fuel cap, fitting, and carbon requirements) and test procedures will be harmonized with U.S. EPA
- For MY2014 and later, ARB proposes to set more stringent standards for fuel hose and fuel tank permeation, diurnal emissions, and require fuel injection
- For MY2016 and later, ARB proposes to lower the fuel hose permeation standard
 - Executive Officer must confirm commercial availability



Evaporative Emission Design Standards Cont.

> 30 kW Trailerable Vessels

Evaporative Emission Design Standards for Trailerable > 30 kW Vessels

Model Year Effective Date	Fuel Hose Permeation (grams ROG/m ² /day)	Fuel Tank Permeation (grams ROG/m ² /day)	Diurnal Requirement (grams HC/gallon/day)		Meet Fuel Injection Definition or Equivalent Performance Standard (grams HC/hour)
			Canister	Non-Canister	
2012 and 2013	15.0	1.5	0.40	N/A	None
Test Procedure	40 CFR §1060.515	40 CFR §1060.520	40 CFR §1060.525		None
2014 and 2015	10.0	0.7	0.25	65% reduction from uncontrolled HC emissions**	0.2
2016 and later	5.0*	0.7	0.25	65% reduction from uncontrolled HC emissions**	0.2
Test Procedure	40 CFR §1060.515	40 CFR §1060.520	TP-1503		TP-1502

* must be performed at 40°C

** refers to vented emissions from fuel tank



Evaporative Emission Design Standards Cont.

> 30 kW Nontrailerable Vessels

- For MY2012 and MY2013, all evaporative emission standards (including fuel cap, fitting, and carbon requirements) and test procedures will be harmonized with U.S. EPA
- For MY2014 and later, ARB proposes to set more stringent fuel hose and fuel tank permeation standards, and require fuel injection
- For MY2016 and later, ARB proposes to lower the fuel hose permeation standard
 - Executive Officer must confirm commercial availability



Evaporative Emission Design Standards Cont.

> 30 kW Nontrailerable Vessels

Evaporative Emission Design Standards for Nontrailerable > 30 kW Vessels

Model Year Effective Date	Fuel Hose Permeation (grams ROG/m ² /day)	Fuel Tank Permeation (grams ROG/m ² /day)	Diurnal Requirement (grams HC/gallon/day)		Meet Fuel Injection Definition or Equivalent Performance Standard (grams HC/hour)
2012 and 2013	15.0	1.5	0.16		None
Test Procedure	40 CFR §1060.515	40 CFR §1060.520	40 CFR §1060.525		None
2014 and 2015	10.0	0.7	0.16	65% reduction from uncontrolled HC emissions**	0.2
2016 and later	5.0*	0.7	0.16	65% reduction from uncontrolled HC emissions**	0.2
Test Procedure	40 CFR §1060.515	40 CFR §1060.520	TP-1503		TP-1502

* must be performed at 40°C

** refers to vented emissions from fuel tank



Evaporative Emission Performance Standard

- As an alternative, evaporative system builders may test a complete fuel system

Alternative Evaporative Emission Performance Standard for > 30 kW Vessels

Model Year Effective Date	Marine Vessel Type	Diurnal Standard grams HC/day
2014 and later	All Marine Vessels With Engines > 30 kW	$0.048 * \text{Tank Volume (liters)} + 0.97$
	Test Procedure	TP-1501

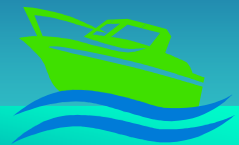


Proposed Test Procedures

- Fuel Hose Permeation
 - 40 CFR 1060.515 as adopted by ARB
 - 10 g/m²/day fuel hose must be tested at 23°C
 - 5 g/m²/day fuel hose must be tested at 40°C
 - As an alternative, SAE J1737 can be used
 - Must use E10 or CE10 as a test fuel
- Fuel Tank Permeation
 - 40 CFR 1060.520 as adopted by ARB
 - Must use E10 or CE10 as a test fuel

Proposed Test Procedures Cont.

- Venting Control
 - TP-1503
 - Trailerable vessels must use E10 as a test fuel
 - Nontrailerable vessels must use gasoline specified in 40 CFR 1065.710 as a test fuel
- Fuel Injection Equivalent
 - TP-1502 (3-Hour Hot Soak)
 - Must use E10 as a test fuel



Proposed Test Procedures Cont.

- Alternative Performance Testing
 - TP-1501 (1-Day Diurnal)
 - 65°F-105°F-65°F Temperature Profile
 - Must use E10 as a test fuel

Deck Fill Plate and Fuels Compatibility

- Deck Fill Plate Compatibility
 - Must comply with the design specifications for the fill pipe face as set forth in section 2235, Chapter 4.4, Division 3, Title 13 of the California Code of Regulations (Amended: 9-17-91)

Deck Fill Plate and Fuels Compatibility Cont.

- Fuels Compatibility
 - All evaporative emission components must be compatible with all California commercial pump fuels formulated for use in spark-ignition marine vessels

Defects and Warranty Requirements

- Defects Warranty Requirements
 - U.S. EPA sections will be replaced with ARB only warranty requirements
- Evaporative Emission Control Warranty Statement
 - Any application for certification must include a copy of an ARB emission control warranty statement
- Emission-Related Defect Reporting Requirements
 - Must file a defect information report whenever an evaporative emission-related defect exists in 10% of production or 20 or more vessels within an evaporative family

Compliance Testing

- New Equipment Compliance Testing
 - The Executive Officer may test ARB certified evaporative components in groups of five
 - A complete vessel may be tested if certified using the performance alternative

Compliance Relief

- Variance
 - Any manufacturer that cannot meet the applicable requirements due to extraordinary reasons beyond their control may apply in writing for a variance

Costs Associated with U.S. EPA and ARB Rules

	Cost Range to meet U.S. EPA requirements*	Additional costs to meet ARB requirements
Fuel Hose 1/4 in, per foot	\$0.25 to \$0.85	\$0.44 to \$1.20**
Fuel Tanks PWC, ~17 gallons Installed, ~57 gallons	\$1.29 to \$26.00 \$39.00 to \$81.00 (barrier materials only)	\$0 to \$100.00 \$0 to \$29.00 (barrier and tank materials)
Carbon Canister 20 to 100 gallon fuel tank	\$12.00 to \$38.00	\$0.67 to \$7.73***

*Source: U.S. EPA Final Regulatory Impact Analysis, September 2008

**Source: ARB Cost Surveys and Manufacturers Quotes for 5 g/m²/day at 40°C in MY2016

***Assumption: Extrapolated quote prices for more efficient canister to meet ARB standard of 0.25 g/gal/day with 7 RVP fuel over EPA standard 0.4 g/gal/day with 9 RVP



Request for Canister Control Cost

- ARB requests the increased canister cost to meet the more stringent ARB venting standard of 0.25 g/gal/day using 7 RVP fuel over the U.S. EPA venting standard of 0.4 g/gal/day using 9 RVP fuel

Estimated Retail Costs

- The estimated increase in retail cost for representative vessels was determined from cost surveys

Estimated Increase in Retail Cost for Representative Vessels*

Vessel Category	Average Estimated Total Retail Cost Increase**	
	Costs for meeting the MY2014 and MY2015 Requirements	Additional Cost if the Fuel Hose Standard is lowered in MY2016
Personal Watercraft	\$41	\$7
Outboard	\$23	\$11
Sterndrive/Inboard	\$25	\$13

*Includes all required controls

**Retail cost includes two levels of markup (Sources: Boating Industry.com, MarketResearch.com)

Comments and Responses

(from March 3, 2010 Industry Meeting)

- **Comment:** Proposed certification requirement for boat builders is burdensome
- **Response:** In order for ARB to enforce the standards, all vessels must be certified in California. ARB will make every effort to develop a streamlined certification process

Comments and Responses Cont.

(from March 3, 2010 Industry Meeting)

- **Comment:** A fuel hose that permeates $<5 \text{ g/m}^2/\text{day}$ at 40°C is not available because the California market is not large enough to support its production
- **Response:** ARB agrees and will set an initial standard of $10 \text{ g/m}^2/\text{day}$ at 23°C . ARB will lower the hose permeation standard if availability is confirmed

Comments and Responses Cont.

(from March 3, 2010 Industry Meeting)

- **Comment:** Limit fuel compatibility to only those California fuels intended for use with spark-ignition marine vessels
- **Response:** ARB agrees and has modified the draft regulation

Comments and Responses Cont.

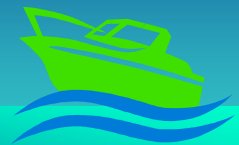
(from March 3, 2010 Industry Meeting)

- **Comment:** Drop compatible fuel deck plate requirements for nontrailerable vessels
- **Response:** Dropped fuel deck plate requirement for nontrailerable vessels

Comments and Responses Cont.

(from March 3, 2010 Industry Meeting)

- **Comment:** Consider industry approved durability specifications
- **Response:** ARB will incorporate into TP-1503
- **Comment:** Address need for relief when required components are not available
- **Response:** Variance section of regulation addresses need for relief



Questions?

- Please state your name and affiliation when commenting
- When possible please provide written comments in addition to verbal comments

Contacts

For Questions Concerning Evaporative Emissions

– Scott Monday

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For Questions Concerning Emissions Inventory

– David Chou

- Manager, Off-Road Modeling and Assessment Section
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For Questions Concerning Certification

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- Manager, Off-Road Certification/Audit Section
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