

# Evaporative Emission Standards for Boats



**Office of Transportation and  
Air Quality**

**Boat-Builder Workshop  
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# New Standards

## SI Marine

- Portable tanks
  - Tank permeation
  - Self-sealing vent
- Vessels
  - Hose and tank permeation
  - Diurnal emissions
  - Refueling spillage



## Small SI as well

- Hose and tank permeation
- Running loss





# Marine Evap Standards

<b>Standard/ Category</b>	<b>Hose Permeation</b>	<b>Tank Permeation</b>	<b>Diurnal</b>
<b>Standard level</b>	<b>15 g/m<sup>2</sup>/day</b>	<b>1.5 g/m<sup>2</sup>/day</b>	<b>0.40 g/gal/day</b>
<b>Portable tanks</b>	<b>2009<sup>a</sup></b>	<b>2011</b>	<b>2010<sup>b</sup></b>
<b>PWC</b>	<b>2009</b>	<b>2011</b>	<b>2010</b>
<b>Other tanks</b>	<b>2009<sup>a</sup></b>	<b>2012</b>	<b>2011<sup>c,d</sup></b>

<sup>a</sup> 2011 for primer bulbs. Phase-in for OB under-cowl fuel lines, by length: 30% in 2010, 60% in 2011, 90% in 2012, 100% in 2015.

<sup>b</sup> Design standard.

<sup>c</sup> Fuel tanks installed in nontrailerable boats ( $\geq 26$  ft. in length or  $>8.5$  ft. in width) may meet a standard of 0.16 g/gal/day over an alternative test cycle.

<sup>d</sup> The standard is effective July 31, 2011. For boats with installed fuel tanks, this standard is phased-in 50%/100% over the first two years. As an alternative, small manufacturers may participate in a diurnal allowance program.



# Fuel Line Permeation

- Fuel line
  - 15 g/m<sup>2</sup>/day, 2009
    - Fuel CE10, 23°C
    - Precondition 8 weeks at 23°C or 4 weeks at 43°C
  - Boat and engine hose
    - Phase-in for under-cowl fuel line
  - Fuel lines for portable tanks
  - Primer bulbs, 2011
- Vent and fill lines
  - Standards apply if fuel stays in filler neck after normal refueling event
- Fuel line manufacturers expected to certify



# Fuel Tank Permeation

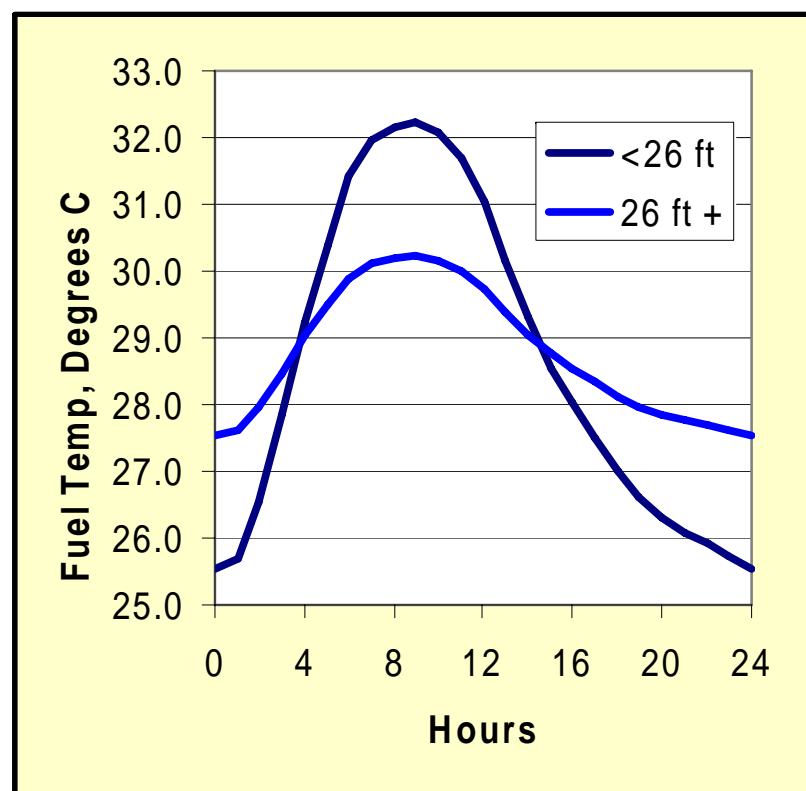
- 1.5 g/m<sup>2</sup>/day
  - E10 fuel, 28°C
  - Preconditioning
    - Fuel soak
    - Durability testing
  - Direct-mounted caps are included
- Design-based certification
  - Metal tanks
  - Automotive type multi-layer tanks
- Emission credits for measured emissions from nonmetal tanks
- Tank manufacturer expected to certify





# Diurnal Standards

- Portable fuel tanks
  - Self-sealing valve
  - No venting up to 5.0 psi
  - Fully sealed up to 3.5 psi
- Installed tanks
  - Trailerable boats (<26 ft)
    - 0.40 g/gal/day
    - 25.6-32.2°C
  - Nontrailerable boats
    - 0.16 g/gal/day
    - 27.6-30.2°C
  - Must prevent water and liquid fuel from reaching canister
- Tank manufacturer expected to certify
  - Canister manufacturer or boat builder may certify instead





# Design-based certification

- Seal tank (up to 1.0 psi)
  - Can use pressure mitigation (e.g., bladder)
- Passive-purge carbon canister
  - Carbon specifications: Carbon: (1) butane working capacity, (2) carbon volume, (3) moisture adsorption, (4) dust attrition, (5) mean diameter of carbon
  - Canister specifications: (1) L/D ratio of 3.5 or higher, (2) structural integrity, (3) volume compensation to hold pellets in place, (4) vapor flow path:



canister in boat



# Refueling

- Fuel nozzle standards
  - Marinas must use standard nozzles whenever they replace existing nozzles or install new ones
  - Same to those already used for motor vehicle pumps
    - Standardized dimensions
    - Automatic shut-off
- System integration
  - Vessels must be built so operators can “reasonably be expected to fill the fuel tank without spitback or spillage” (§1060.101(f))
  - Fuel systems should be designed to allow flow to nozzle for automatic shut-off
  - Will help with carbon canister installation designs
  - No application for certification is required





# System Integration

- Industry consensus standards
  - SAE J1527 addresses hose permeation
  - ABYC H24 potential vehicle for specifying best practices for fuel system designs
  - NMMA certification
- Canister installation standards
  - Industry is developing canister installation practices in context of EPA & USCG standards
  - ABYC is assessing fuel/air separators and fuel system designs for spillage control





# Certification Requirements

- Boat-builder certification requirements
  - Boat-builders must either
    - Install certified evaporative components (fuel tanks, fuel lines and diurnal systems) in the vessel or
    - Certify components themselves – boat-builders would become component manufacturers
  - Vessels must be certified if boat-builder participates in Averaging, Banking, Trading (ABT) program



# Labeling Requirements

- Component manufacturers (§1060.137)
  - Add detailed label information:
    - Include company name, emission family, compliance statement, and FEL (if applicable)
    - Fuel lines include numbers or code to identify emission level
  - Or, alternatively, use coded abbreviation
    - e.g., “EPA-MFR-A15”
- Boat builders (§1060.135)
  - Non-certifying boat builders -
    - Include compliance statement and company name
    - Label may be combined with Coast Guard label
  - Certifying boat builders:
    - Evap label must include company name, build date, compliance statement
    - Identify certified components with master code, or individual codes to match component markings



# General Certification Provisions

- General certification provisions apply for all standards under 40 CFR part 1060
- Component manufacturers expected to certify fuel tanks and fuel lines (§1060.5 and §1060.205)
  - Certification may be delegated to equipment manufacturers that want to certify (§1060.601(f))
  - Diurnal compliance may also be delegated to system integrator
- Regulation specifies parameters for including different products in the same emission family (§1060.230)
- Test worst-case model in the emission family (§1060.235)
- Boat builders must keep records (§1060.210)
  - Identify models and production volumes
  - Identify manufacturer, part number and family names of certified components
  - Document compliance with regulatory requirements (installation instructions, labeling, sealed caps, etc.)



# General Certification Provisions

- Certifying manufacturers are responsible for warranty (§1060.120)
  - Either component or equipment manufacturer may process claims
- Boat builders may use up existing inventory of noncompliant fuel tanks and fuel lines (§1060.601(g))
  - “Normal inventory” requirement does not allow for stockpiling to circumvent standards in first year
- Boat builders not required to comply in first year if the new engine’s model year is from the previous year (§1060.605(f))
  - Example: 2012 standard applies after 2011 engines are used up
  - Separate stockpiling provisions apply for engines (§1068.105(a))
- New fuel tanks and fuel lines replacing certified parts must be certified (§1060.601(b))
  - New parts replacing “pre-evap” installed components are exempt
  - Portable tanks and associated fuel lines are not “installed”
  - Exempt parts (or package) must be labeled to describe limitations on use
  - Starting Jan. 2020, exempt parts must be labeled; companies must take additional steps to prevent exempt parts from replacing certified parts



# Questions

<http://www.epa.gov/otaq/marinesi.htm>

The screenshot shows the EPA website page for "Nonroad Engines, Equipment, and Vehicles". The page title is "Gasoline Boats and Personal Watercraft". A "New" banner indicates a "September 4, 2008, Final Rule: Control of Emissions of Air Pollution from New Nonroad Spark-Ignition Engines, Equipment, and Vessels". The main text states: "EPA has finalized a new emission control program to reduce hydrocarbon, nitrogen oxide, and carbon monoxide emissions from marine spark-ignition engines. The new exhaust emissions standards will take effect in the 2010 model year. The final rule also includes new standards to reduce evaporative emissions from these fuel systems. These standards will reduce the harmful health effects of ozone and carbon monoxide from these engines." Below this, it says: "This page provides general information for consumers, boaters, and other users of outboard motors and personal watercraft that use gasoline engines, or spark-ignition (SI) engines. There are also links to the related regulations and technical documents. For additional information about our emission standards, see our Fact Sheet: [Final Emission Standards for New Nonroad Spark-Ignition Engines, Equipment, and Vessels](#) | [PDF Version](#) (x pp, xK, EPA420-F-08-013). Information is also available on [Diesel Boats and Ships](#) and [Ocean Going Vessels](#)." To the right of the text is a photograph of several boats docked at a marina. The left sidebar contains a navigation menu with items like Aircraft, Diesel Boats & Ships, Gasoline Boats & Personal Watercraft, Nonroad Diesel Equipment, Forklifts, Generators, & Compressors (gasoline/propane), Lawn & Garden (small gasoline equipment), Locomotives, and Snowmobiles, Dirt Bikes, & ATVs.

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