ATTACHMENT A-9

State of California
AIR RESOURCES BOARD

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR
2004 AND SUBSEQUENT MODEL
HEAVY-DUTY OTTO-CYCLE ENGINES

Adopted: December 27, 2000
Amended: December 12, 2002
Amended: July 26, 2007
Amended: October 17, 2007
Amended: September 27, 2010
Amended: March 22, 2012

Note: The proposed amendments to this document are shown in underline to indicate additions and strikeout to indicate deletions compared to the test procedures as last amended September 27, 2010. [No change] indicates proposed federal provisions that are also proposed for incorporation herein without change. Existing intervening text that is not amended in this rulemaking is indicated by "* * * *".

As Amended: March 22, 2012
Date of Hearing: January 26-27, 2012
NOTE: This document is incorporated by reference in section 1956.8(d), title 13, California Code of Regulations (“CCR”) and also incorporates by reference various sections of Title 40, Part 86 of the Code of Federal Regulations, with some modifications. It contains the majority of the requirements necessary for certification of heavy-duty Otto-cycle engines for sale in California, in addition to containing the exhaust emissions standards and test procedures for these Otto-cycle engines. The section numbering conventions for this document are set forth in subparagraph 4 on page 4. Reference is also made in this document to other California-specific requirements that are necessary to complete an application for certification. These other documents are designed to be used in conjunction with this document. They include:

1. “California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles” (incorporated by reference in section 1976, title 13, CCR);  
2. Warranty requirements (sections 2035, et seq., title 13, CCR); 
3. OBD II (section 1968, et seq., title 13, CCR, as applicable); 
4. “California Test Procedures for Evaluating Substitute Fuels and New Clean Fuels through 2014,” (section 2317, title 13, CCR); and 

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR 2004 AND SUBSEQUENT MODEL HEAVY-DUTY OTTO-CYCLE ENGINES

* * * *

Part I. GENERAL PROVISIONS FOR CERTIFICATION AND IN-USE VERIFICATION OF EMISSIONS


1. General Applicability. [§86.xxx-1]

   A. Federal provisions.

      * * * *

   2. §86.005-1 October 6, 2000.

      * * * *

      2.2 Delete subparagraph (b) and replace with the following: A manufacturer must certify any complete heavy-duty vehicle of 14,000 pounds gross vehicle weight rating or less and any 2020 and subsequent model incomplete heavy-duty vehicle of 10,000 pounds gross vehicle weight rating or less in accordance with the medium-duty vehicle provisions contained in the “California 2001 through 2014 Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and for 2009 through 2016 Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles,” incorporated by reference in §1961(d), title 13, CCR or the “California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles,” incorporated by reference in section 1961.2, title 13, CCR, as applicable. Heavy-duty engine or vehicle provisions of subpart A do not apply to such a vehicle.

      * * * *

2. Definitions. [§86.xxx-2]
A. Federal provisions.
All of the definitions in previous CFR sections continue to apply, except as otherwise noted below. Definitions specific to other requirements such as evaporative emissions are contained in those separate documents.

2. §86.010-2. February 24, 2009.

B. California provisions.

* * * *

“Medium-Duty Vehicle” means any 1992 though 2006 model-year heavy-duty low-emission, ultra-low-emission, super-ultra-low-emission or zero-emission vehicle certified to the standards in section 1960.1(h)(2) having a manufacturer’s gross vehicle weight rating of 14,000 pounds or less and any 2000 and subsequent model heavy-duty low-emission, ultra-low-emission, super-ultra-low-emission or zero-emission vehicle certified to the standards in section 1961(a)(1), 1961.2, or 1962 having a manufacturer's gross vehicle weight rating between 8,500 and 14,000 pounds.

* * * *

10. Emission standards for Otto-cycle heavy-duty engines and vehicles. [§86.xxx-10]

A. Federal provisions.

1. §86.098-10. October 6, 2000 April 30, 2010. Amend as follows:

* * * *

2. §86.099-10. [n/a; See evap TPs.]
3. §86.005-10. January 18, 2004 December 8, 2005. Amend as follows:

* * * *

4. §86.008-10. January 18, 2004 April 30, 2010. Amend as follows:

* * * *
B. California provisions.

1. Exhaust emissions from new 2004 and later model year Otto-cycle medium- and heavy-duty engines, except for Otto-cycle medium- and heavy-duty engines subject to the alternative standards in 40 CFR §86.005-10(f), shall not exceed:

**California Emission Standards for 2004 and Subsequent Model**

**Heavy-Duty Otto-Cycle Engines**

(in g/bhp-hr)

<table>
<thead>
<tr>
<th>Model Year</th>
<th>Emission Category</th>
<th>NMHC + NOx</th>
<th>NMHC</th>
<th>NOx</th>
<th>CO₂</th>
<th>HCHO</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2.4 or 2.5 with 0.5 NMHC cap</td>
<td>n/a</td>
<td>n/a</td>
<td>14.4</td>
<td>0.05</td>
<td>n/a</td>
</tr>
<tr>
<td>2004</td>
<td>ULEV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SULEV</td>
<td>2.0</td>
<td>n/a</td>
<td>n/a</td>
<td>7.2</td>
<td>0.025</td>
<td>n/a</td>
</tr>
<tr>
<td>2005 through 2007</td>
<td>ULEV&lt;br/2007&lt;sup&gt;EF&lt;/sup&gt;</td>
<td>1.0&lt;sup&gt;CEF, F&lt;/sup&gt;</td>
<td>n/a</td>
<td>n/a</td>
<td>14.4</td>
<td>0.05</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>SULEV</td>
<td>0.5&lt;sup&gt;CEF, F&lt;/sup&gt;</td>
<td>n/a</td>
<td>n/a</td>
<td>7.2</td>
<td>0.025</td>
<td>n/a</td>
</tr>
<tr>
<td>2008 and subsequent&lt;sup&gt;FG&lt;/sup&gt;</td>
<td>ULEV&lt;br/2008+&lt;sup&gt;FG&lt;/sup&gt;</td>
<td>n/a</td>
<td>0.14&lt;sup&gt;EF&lt;/sup&gt;</td>
<td>0.20&lt;sup&gt;EF&lt;/sup&gt;</td>
<td>14.4</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>SULEV</td>
<td>n/a</td>
<td>0.07&lt;sup&gt;EF&lt;/sup&gt;</td>
<td>0.10&lt;sup&gt;EF&lt;/sup&gt;</td>
<td>7.2</td>
<td>0.005</td>
<td>0.005</td>
</tr>
</tbody>
</table>

**Standards for Heavy-Duty Otto-Cycle Engines Used In Heavy-Duty Vehicles Over 14,000 pounds GVW**

<table>
<thead>
<tr>
<th>Model Year</th>
<th>NMHC + NOx</th>
<th>NMHC</th>
<th>NOx</th>
<th>CO₂</th>
<th>HCHO</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>2.4 or 2.5 with 0.5 NMHC cap</td>
<td>n/a</td>
<td>n/a</td>
<td>37.1</td>
<td>0.05&lt;sup&gt;DE&lt;/sup&gt;</td>
<td>n/a</td>
</tr>
<tr>
<td>2005 through 2007&lt;sup&gt;EF&lt;/sup&gt;</td>
<td>n/a</td>
<td>1.0&lt;sup&gt;C, E&lt;/sup&gt;</td>
<td>n/a</td>
<td>n/a</td>
<td>37.1</td>
<td>0.05&lt;sup&gt;DE&lt;/sup&gt;</td>
</tr>
<tr>
<td>2008 and subsequent&lt;sup&gt;FG&lt;/sup&gt;</td>
<td>n/a</td>
<td>0.14&lt;sup&gt;EF&lt;/sup&gt;</td>
<td>0.20&lt;sup&gt;E&lt;/sup&gt;</td>
<td>14.4</td>
<td>0.01</td>
<td>0.01</td>
</tr>
</tbody>
</table>

<sup>A</sup> These standards apply to petroleum-fueled, alcohol-fueled, liquefied petroleum gas-fueled and natural gas-fueled Otto-cycle engines. Alcohol-fueled engines have the option of certifying to the organic material hydrocarbon equivalent ("OMHCE") or organic material non-methane hydrocarbon equivalent ("OMNMHCE") standard.

<sup>B</sup> For the 2020 and subsequent model years, medium-duty vehicles 8,501 to 10,000 pounds GVW must certify to the primary emission standards and test procedures for complete vehicles specified in section 1961.2, title 13, CCR.

<sup>BC</sup> A manufacturer of engines used in incomplete medium-duty vehicles may choose to comply with these standards as an alternative to the primary emission standards and test procedures for complete vehicles specified in section 1961 or 1961.2, title 13, CCR. A manufacturer that chooses to comply with these optional heavy-duty engine standards and test procedures shall certify that the engine was manufactured consistent with the requirements of this subchapter.

As Amended: March 22, 2012
Date of Hearing: January 26-27, 2012
procedures shall specify, in the Part I application for certification, an in-use compliance test procedure, as provided in section 2139(c), title 13 CCR.

DE. A manufacturer may request to certify to the Option 1 or Option 2 federal NMHC + NOx standards as set forth in 40 CFR §86.005-10(f). However, for engines used in medium-duty vehicles the formaldehyde level must meet the standard specified above.

EF. This standard only applies to methanol-fueled Otto-cycle engines.

FG. A manufacturer may elect to include any or all of its medium- and heavy-duty Otto-cycle engine families in any or all of the emissions ABT programs for HDEs, within the restrictions described in section I.15 of these test procedures. For engine families certified to the Option 1 or 2 federal standards the FEL must not exceed 1.5 g/bhp-hr. If a manufacturer elects to include engine families certified to the 2005 and subsequent model year standards, the NOx plus NMHC FEL must not exceed 1.0 g/bhp-hr. For engine families certified to the 2008 and subsequent model year standards, the FEL is the same as set forth in 40 CFR 86.008-10(a)(1).

FH. A manufacturer may elect to include any or all of its medium- and heavy-duty Otto-cycle engine families in any or all of the emissions ABT programs for HDEs, within the restrictions described in section I.15 of these test procedures.

FI. Idle carbon monoxide: For all Otto-cycle heavy-duty engines utilizing aftertreatment technology, and not certified to the on-board diagnostics requirements of title 13, CCR, §1968, et seq, as applicable, the CO emissions shall not exceed 0.50 percent of exhaust gas flow at curb idle.

2. Optional Standards for Complete Heavy-Duty Vehicles.

Manufacturers may request to group complete heavy-duty vehicles into the same test group as vehicles certifying to the LEV III exhaust emission standards and test procedures specified in title 13, CCR, §1961.2, so long as those complete heavy-duty Otto-cycle vehicles meet the most stringent LEV III standards to which any vehicle within that test group certifies.

* * * *

14. Small-volume manufacturers certification procedures. [§86.xxx-14].

[Note: A small volume manufacturer shall mean a California small volume manufacturer as defined in Section I.1.A., above. Any reference to 10,000 units shall mean 4,500 units in California based on a three year running average as defined in I.1.A., above.]

1. §86.094-14. January 3, 1996 April 30, 2010. Amend as follows:

* * * *

2. §86.096-14. March 24, 1993. [n/a; pertains to evaporative requirements.]


* * * *


[No change.]
17. **Emission control diagnostic system for light-duty vehicles and trucks.**

   [§86.099-17; §86.005-17; §86.007-17] Delete; replace with: All heavy-duty Otto-
   cycle engines up to 14,000 pounds GVW must have an on-board diagnostic
   system as required in section 1968, et seq., title 13, CCR, as applicable.

21. **Application for certification** [§86.xxx-21]

   **A. Federal provisions.**
   1. §86.004-21. October 6, 2000. [No change.]
   2. §86.007-21. October 6, 2000 August 30, 2006. [No change - diesel only.]

26. **Mileage and service accumulation; emission measurements.** [§86.004-26]

   October 6, 2000 July 13, 2005.

28. **Compliance with emission standards.** [§86.xxx-28]

   **A. Federal provisions.**

   **B. California provisions.**
   1. All dedicated methanol-fueled and fuel-flexible vehicles and engines shall
      comply with the requirements which are applicable to heavy-duty gasoline-fueled
      Otto-cycle vehicles and engines, except where otherwise noted. In particular, for
      fuel-flexible vehicles and engines, a manufacturer’s proposed durability
      demonstration program, as required in sections 86.094-21 86.004-21(b)(5)(i)(A),
      86.007-21(b)(5)(i)(A), 86.001-23(b)(1)(ii), and 86.098-23 86.007-23(b)(1)(ii), shall
      provide for the assessment of the durability of the engine in operation with
      methanol and gasoline, as well as intermediate mixtures of both fuels. A
      manufacturer’s proposed mileage and service accumulation, as required in
      section 86.096-24 86.001-24(c), shall be conducted on methanol.

30. **Certification.** [§86.xxx-30].

   1. §§86.004-30. October 6, 2000. [No change.]
   2. §86.007-30. February 24, 2009. [No change.]

38. **Maintenance instructions.** [§86.xxx-38]

2. §86.007-38. January 18, 2004 June 29, 2004. [No change, except as noted above for §86.004-38 subparagraph (g)(1).]

3. §86.010-38. April 30, 2010. [No change, except as noted above for §86.004-38 subparagraph (g)(1).]
Part II. OTHER REQUIREMENTS; TEST PROCEDURES

Subpart N. Emission Regulations for New Otto-Cycle and Diesel Heavy-Duty Engines; Gaseous and Particulate Exhaust Test Procedures

* * * *

86.1304-90 Section numbering; construction. October 6, 2000 July 13, 2005.
86.1305-2010 Introduction; structure of subpart. September 15, 2011.

* * * *

86.1313-98 Fuel specifications. February 18, 2000. [n/a diesel fuel specifications.]


Amend the federal fuel specifications as follows:

   1.1 Certification Gasoline Fuel Specifications for the 2004 through 2019 Model Years.

Add the following subparagraph which reads: For 2004 through 2019 model engines certifying in accordance with these test procedures, gasoline having the specifications listed below may be used in exhaust and evaporative emission testing as an option to the specifications referred to in §86.1313-94(a)(1) and in §86.1313-2004(a)(1). If a manufacturer elects to utilize this option, both exhaust and evaporative emission testing shall be conducted by the manufacturer with gasoline having the specifications listed below, and the Executive Officer shall conduct exhaust and evaporative emission testing with gasoline having the specifications listed below. For the 2015 through 2019 model years, gasoline having the specifications listed in Part II, Section A.1.2 may be used in exhaust and evaporative emission testing as an option to the specifications referred to in §86.113-94(a)(1), §86.113-04(a)(1), and this section A.1.1. If a manufacturer elects to certify a 2015 through 2019 model year engine using gasoline having the specifications listed in Part II, Section A.1.2, both exhaust and evaporative emission testing shall be conducted by the manufacturer with gasoline having the specifications listed in Part II, Section A.1.2, and the Executive Officer shall conduct exhaust and evaporative emission testing with gasoline having the specifications listed in Part II, Section A.1.2.
## California Certification Gasoline Specifications for the 2004 through 2019 Model Years

<table>
<thead>
<tr>
<th>Fuel Property</th>
<th>Limit</th>
<th>Test Method&lt;sup&gt;(b)&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Octane (R+M)/2</td>
<td>91 (min)</td>
<td>D 2699-88, D 2700-88</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>7.5 (min)</td>
<td>D 2699-88, D 2700-88</td>
</tr>
<tr>
<td>Lead</td>
<td>0-0.01g/gal (max); no lead added</td>
<td>§2253.4(c), title 13 CCR</td>
</tr>
<tr>
<td>Distillation Range:</td>
<td></td>
<td>§2263, title 13 CCR&lt;sup&gt;(c)&lt;/sup&gt;</td>
</tr>
<tr>
<td>10% point</td>
<td>130-150 °F</td>
<td></td>
</tr>
<tr>
<td>50% point</td>
<td>200-210 °F</td>
<td></td>
</tr>
<tr>
<td>90% point</td>
<td>290-300 °F</td>
<td></td>
</tr>
<tr>
<td>EP, maximum</td>
<td>390 °F</td>
<td></td>
</tr>
<tr>
<td>Residue</td>
<td>2.0 vol. % (max)</td>
<td></td>
</tr>
<tr>
<td>Sulfur</td>
<td>30-40 ppm by wt.</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>0.005 g/gal (max)</td>
<td>§2253.4(c), title 13 CCR</td>
</tr>
<tr>
<td>RVP</td>
<td>6.7-7.0 psi</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Olefins</td>
<td>4.0-6.0 vol. %</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Total Aromatic Hydrocarbons</td>
<td>22-25 vol. %</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Benzene</td>
<td>0.8-1.0 vol. %&lt;sup&gt;(f)&lt;/sup&gt;</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Multi-substituted Alkyl Aromatic Hydrocarbons</td>
<td>12-14 vol. %&lt;sup&gt;(g)&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>MTBE</td>
<td>10.8-11.2 vol. %</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Additives</td>
<td>Sufficient to meet requirements of §2257, title 13 CCR</td>
<td></td>
</tr>
<tr>
<td>Copper Corrosion</td>
<td>No. 1</td>
<td>D 130-88</td>
</tr>
<tr>
<td>Gum, washed</td>
<td>3.0 mg/100 mL (max)</td>
<td>D 381-86</td>
</tr>
<tr>
<td>Oxidation Stability</td>
<td>1000 minutes (min)</td>
<td>D 525-88</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>Report&lt;sup&gt;(h)&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Heat of Combustion</td>
<td>Report&lt;sup&gt;(h)&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Carbon</td>
<td>Report wt. %&lt;sup&gt;(h)&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Hydrogen</td>
<td>Report wt. %&lt;sup&gt;(h)&lt;/sup&gt;</td>
<td></td>
</tr>
</tbody>
</table>

<sup>(a)</sup> The gasoline must be blended from typical refinery feedstocks.

<sup>(b)</sup> ASTM specification unless otherwise noted. A test method other than that specified may be used following a determination by the Executive Officer that the other method produces results equivalent to the results with the specified method.
Although §2263, title 13, CCR refers to the temperatures of the 50 and 90 percent points, this procedure can be extended to the 10 percent and end point temperatures, and to the determination of the residue content.

The range for interlaboratory testing is 195-215°F.

The range for interlaboratory testing is 285-305°F.

The range for interlaboratory testing is 0.7-1.1 percent by volume.


The fuel producer should report this fuel property to the fuel purchaser. Any generally accepted test method may be used and shall be identified in the report.

1.2 Certification Gasoline Fuel Specifications for the 2020 and Subsequent Model Years.

Add the following subparagraph which reads: For 2020 and subsequent model engines, gasoline having the specifications listed below shall be used in exhaust and evaporative emission testing and the Executive Officer shall conduct exhaust and evaporative emission testing with gasoline having the specifications listed below.

### California Certification Gasoline Specifications for the 2020 and Subsequent Model Years

<table>
<thead>
<tr>
<th>Fuel Property[a]</th>
<th>Limit</th>
<th>Test Method [b]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Octane (R+M)/2</td>
<td>87-88.4; 91 (min)</td>
<td>D 2699-88, D 2700-88</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>7.5 (min)</td>
<td>D 2699-88, D 2700-88</td>
</tr>
<tr>
<td>Lead</td>
<td>0-0.01g/gal (max); no lead added</td>
<td>§2253.4(c), title 13 CCR</td>
</tr>
<tr>
<td>Distillation Range:</td>
<td></td>
<td>§2263, title 13 CCR[2]</td>
</tr>
<tr>
<td>10% point</td>
<td>130-150°F</td>
<td>§2263, title 13 CCR[2]</td>
</tr>
<tr>
<td>50% point</td>
<td>205-215°F</td>
<td>§2263, title 13 CCR[2]</td>
</tr>
<tr>
<td>90% point</td>
<td>310-320°F</td>
<td>§2263, title 13 CCR[2]</td>
</tr>
<tr>
<td>EP, maximum</td>
<td>390°F</td>
<td>§2263, title 13 CCR[2]</td>
</tr>
<tr>
<td>Residue</td>
<td>2.0 vol. % (max)</td>
<td>§2263, title 13 CCR[2]</td>
</tr>
<tr>
<td>Sulfur</td>
<td>8-11 ppm by wt.</td>
<td>§2263, title 13 CCR[2]</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>0.005 g/gal (max)</td>
<td>§2253.4(c), title 13 CCR</td>
</tr>
<tr>
<td>RVP</td>
<td>6.9-7.2 psi</td>
<td>§2263, title 13 CCR[2]</td>
</tr>
<tr>
<td>Olefins</td>
<td>4.0-6.0 vol. %</td>
<td>§2263, title 13 CCR[2]</td>
</tr>
<tr>
<td>Total Aromatic Hydrocarbons</td>
<td>19.5-22.5 vol. %</td>
<td>§2263, title 13 CCR[2]</td>
</tr>
<tr>
<td>Benzene</td>
<td>0.6-0.8 vol. %</td>
<td>§2263, title 13 CCR[2]</td>
</tr>
</tbody>
</table>

As Amended: March 22, 2012
Date of Hearing: January 26-27, 2012
<table>
<thead>
<tr>
<th>Property</th>
<th>Requirement</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTBE</td>
<td>0.05 vol. %</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Ethanol</td>
<td>9.8-10.2 vol. %</td>
<td></td>
</tr>
<tr>
<td>Total Oxygen</td>
<td>3.3-3.7 wt. %</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Additives</td>
<td>Sufficient to meet requirements of §2257, title 13 CCR</td>
<td></td>
</tr>
<tr>
<td>Copper Corrosion</td>
<td>No. 1</td>
<td>D 130-88</td>
</tr>
<tr>
<td>Gum, washed</td>
<td>3.0 mg/100 mL (max)</td>
<td>D 381-86</td>
</tr>
<tr>
<td>Oxidation Stability</td>
<td>1000 minutes (min)</td>
<td>D 525-88</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>Report (h)</td>
<td></td>
</tr>
<tr>
<td>Heat of Combustion</td>
<td>Report (h)</td>
<td></td>
</tr>
<tr>
<td>Carbon</td>
<td>Report wt. % (h)</td>
<td></td>
</tr>
<tr>
<td>Hydrogen</td>
<td>Report wt. % (h)</td>
<td></td>
</tr>
</tbody>
</table>

(a) The gasoline must be blended from typical refinery feedstocks.
(b) ASTM specification unless otherwise noted. A test method other than that specified may be used following a determination by the Executive Officer that the other method produces results equivalent to the results with the specified method.
(c) Although §2263, title 13, CCR refers to the temperatures of the 50 and 90 percent points, this procedure can be extended to the 10 percent and end point temperatures, and to the determination of the residue content.
(d) The range for interlaboratory testing is 195-215°F.
(e) The range for interlaboratory testing is 285-305°F.
(f) The range for interlaboratory testing is 0.7-1.1 percent by volume.
(h) The fuel producer should report this fuel property to the fuel purchaser. Any generally accepted test method may be used and shall be identified in the report.
(i) For vehicles/engines that require the use of premium gasoline as part of their warranty, the Octane ((R+M)/2) shall be a 91 minimum. All other certification gasoline specifications, as shown in this table, must be met. For all other vehicles/engines, the Octane ((R+M)/2) shall be 87-88.4.

* * * * *
B. California Provisions.

1. Identification of New Clean Fuels to be Used in Certification Testing.

   Any person may petition the state board to establish by regulation certification testing specifications for a new clean fuel for which specifications for a new clean fuel are not specifically set forth in paragraph 86.1313-94 as amended herein. Prior to adopting such specifications, the state board shall consider the relative cost-effectiveness of use of the fuel in reducing emissions compared to the use of other fuels. Whenever the state board adopts specifications for a new clean fuel for certification testing, it shall also establish by regulation specifications for the fuel as it is sold commercially to the public.

   (a) If the proposed new clean fuel may be used to fuel existing motor vehicles, the state board shall not establish certification specifications for the fuel unless the petitioner has demonstrated that:

      (1) Use of the new clean fuel in such existing motor vehicles would not increase emissions of NMOG (on a reactivity-adjusted basis), NOx, CO, and the potential risk associated with toxic air contaminants, as determined pursuant to the procedures set forth in "California Test Procedures for Evaluating Substitute Fuels and New Clean Fuels through 2014," as adopted September 17, 1993 or the "California Test Procedures for Evaluating Substitute Fuels and New Clean Fuels in 2015 and Subsequent Years," as applicable. In the case of fuel-flexible vehicles or dual-fuel vehicles which were not certified on the new clean fuel but are capable of being operated on it, emissions during operation with the new clean fuel shall not increase compared to emissions during vehicle operation on gasoline.

* * * *


* * * *


* * * *


* * * *

B. California Provisions.

1. Non-methane hydrocarbon emissions shall be measured in accordance with the "California Non-Methane Organic Gas Test Procedures," as last amended July 30, 2002, which is incorporated by reference in section 1956.8(d), title 13, CCR.

* * * *

PART 1065 – ENGINE-TESTING PROCEDURES.

Subpart A – Applicability and General Provisions.

1065.1 Applicability. September 15, 2011.
   1. Amend subparagraph (a) as follows:
      1.1. Introductory paragraph. [No change.]
      1.2. Subparagraphs (a)(1). [n/a]
      1.3. Amend subparagraph (a)(2) as follows: Model year 2010 and later heavy-duty highway engines we regulate under title 13, CCR, §1956.8. For earlier model years, manufacturers may use the test procedures in this part or those specified in 40 CFR part 86, subpart N, according to §1065.10, as modified by these test procedures.
      1.4. Subparagraphs (a)(3) through (a)(8). [n/a]
   2. Subparagraph (b). [n/a]
   3. Subparagraph (c) through (g). [No change.]

1065.2 Submitting information to EPA under this part. April 30, 2010.
   1. Subparagraphs (a) through (d). [No change.]
   2. Amend subparagraph (e) as follows: See title 13, CCR, section 91011 for provisions related to confidential information. Note that according to this section, emission data shall not be identified as confidential.
   3. Subparagraph (f). [No change.]

1065.5 Overview of this part 1065 and its relationship to the standard-setting part. October 30, 2009.

1065.10 Other procedures. April 30, 2010.
1065.15 Overview of procedures for laboratory and field testing. September 15, 2011.
1065.20 Units of measure and overview of calculations. September 15, 2011.

Subpart B – Equipment Specifications.

1065.125 Engine intake air. September 15, 2011.
1065.140 Dilution for gaseous and PM constituents. September 15, 2011.
1065.145 Gaseous and PM probes, transfer lines, and sampling system components. April 30, 2010.
1065.170 Batch sampling for gaseous and PM constituents. September 15, 2011.
1065.190 PM-stabilization and weighing environments for gravimetric analysis. September 15, 2011.

Subpart C – Measurement Instruments.

1065.205 Performance specifications for measurement instruments. September 15, 2011.

Measurement of Engine Parameters and Ambient Conditions


Flow-Related Measurements

1065.225 Intake-air flow meter. September 15, 2011.

CO and CO₂ Measurements


Hydrocarbon Measurements

1065.267 Gas chromatograph. September 15, 2011.

NOx Measurements

1065.275 N₂O measurement devices. September 15, 2011.
O₂ Measurements

1065.280 Paramagnetic and magnetopneumatic O₂ detection analyzers. September 15, 2011.

Air-to Fuel Ratio Measurements

1065.284 Zirconia (ZrO₂) analyzer. September 15, 2011.

PM Measurements

1065.295 PM inertial balance for field-testing analysis. September 15, 2011.

Subpart D – Calibrations and Verifications.

1065.303 Summary of required calibration and verifications. September 15, 2011.

Measurement of Engine Parameters and Ambient Conditions


Flow-Related Measurements

1065.341 CVS and batch sampler verification (propane check). September 15, 2011.

CO and CO₂ Measurements
1065.350  H₂O interference verification for CO₂ NDIR analyzers. September 15, 2011.

Hydrocarbon Measurements

1065.360  FID optimization and verification. September 15, 2011.

NOx Measurements

1065.370  CLD CO₂ and H₂O quench verification. September 15, 2011.
1065.372  NDUV analyzer HC and H₂O interference verification. September 15, 2011.
1065.378  NO₂-to-NO converter conversion verification. September 15, 2011.

PM Measurements


Subpart E – Engine Selection, Preparation, and Maintenance.


Subpart F – Performing an Emission Test in the Laboratory.

1065.514  Cycle-validation criteria. September 15, 2011.
1065.520  Pre-test verification procedures and pre-test data collection. September 15, 2011.
1065.530  Emission test sequence. September 15, 2011.
1065.546 Validation of minimum dilution ratio for PM batch sampling and drift correction. September 15, 2011.
1065.550 Gas analyzer range validation, drift validation, and drift correction. September 15, 2011.

**Subpart G – Calculations and Data Requirements.**

1065.642 SSV, CFV, and PDP molar flow rate calculations. September 15, 2011.
1065.655 Chemical balances of fuel, intake air, and exhaust. September 15, 2011.
1065.659 Removed water correction. September 15, 2011.
1065.667 Dilution air background emission correction. September 15, 2011.
1065.670 NOx intake-air humidity and temperature corrections. September 15, 2011.
1065.672 Drift correction. April 30, 2010.
1065.675 CLD quench verification calculations. September 15, 2011.

**Subpart H – Engine Fluids, Test Fuels, Analytical Gases and Other Calibration Standards.**


**A. Federal provisions.**

1. Subparagraph (a). [No change.]
2. Amend subparagraph (b) as follows: *Fuels meeting alternative specifications.* We may allow you to use a different test fuel if you show us and we find that using it does not affect your ability to comply with all applicable emission standards using commercially available fuels.
3. Subparagraph (c). [No change.]
4. Amend subparagraph (d) as follows: *Fuel specifications.* The fuel parameters specified in this subpart depend on measurement procedures that are incorporated by reference.
5. Subparagraph (e). [No change.]
B. California provisions.

* * * *

3. Identification of New Clean Fuels to be Used in Certification Testing.

Any person may petition the state board to establish by regulation certification testing specifications for a new clean fuel for which specifications for the new clean fuel are not specifically set forth in paragraph §86.1313-98 as amended herein. Prior to adopting such specifications, the state board shall consider the relative cost-effectiveness of use of the fuel in reducing emissions compared to the use of other fuels. Whenever the state board adopts specifications for a new clean fuel for certification testing, it shall also establish by regulation specifications for the fuel as it is sold commercially to the public.

(a) If the proposed new clean fuel may be used to fuel existing motor vehicles, the state board shall not establish certification specifications for the fuel unless the petitioner has demonstrated that:

(1) Use of the new clean fuel in such existing motor vehicles would not increase emissions of NMHC, NOx, and CO, and the potential risk associated with toxic air contaminants, as determined pursuant to the procedures set forth in the “California Test Procedures for Evaluating Substitute Fuels and New Clean Fuels through 2014,” as adopted September 17, 1993 or the “California Test Procedures for Evaluating Substitute Fuels and New Clean Fuels in 2015 and Subsequent Years,” as applicable. In the case of fuel-flexible vehicles or dual-fuel vehicles that were not certified on the new clean fuel but are capable of being operated on it, exhaust and evaporative emissions from the use of the new clean fuel shall not increase compared to exhaust and evaporative emissions from the use of gasoline that complies with Title 13, Division 3, Chapter 5, Article 1, California Code of Regulations.

(2) Use of the new clean fuel in such existing motor vehicles would not result in increased deterioration of the vehicle and would not void the warranties of any such vehicles.

(b) Whenever the state board designates a new clean fuel pursuant to this section, the state board shall also establish by regulation required specifications for the new clean fuel sold commercially in California.

1065.703 Distillate diesel fuel. April 30, 2010. [n/a]

1. Subparagraph (a). [No change.]
2. Delete subparagraph (b) and replace with the following:
For 2004 through 2019 model engines certifying in accordance with these test procedures, gasoline having the specifications listed below may be used in exhaust and evaporative emission testing as an option to the specifications referred to in §1065.710. If a manufacturer elects to utilize this option, both exhaust and evaporative emission testing shall be conducted by the manufacturer with gasoline having the specifications listed below, and the Executive Officer shall conduct exhaust and evaporative emission testing with gasoline having the specifications listed below. For the 2015 through 2019 model years, gasoline having the specifications listed in the following section (b)(2), may be used in exhaust and evaporative emission testing as an option to the specifications referred to in §1065.710 and this section (b)(1). If a manufacturer elects to certify a 2015 through 2019 model year engine using gasoline having the specifications listed in the following section (b)(2), both exhaust and evaporative emission testing shall be conducted by the manufacturer with gasoline having the specifications listed in the following section (b)(2), and the Executive Officer shall conduct exhaust and evaporative emission testing with gasoline having the specifications listed in the following section (b)(2).

### California Certification Gasoline Specifications for the 2004 through 2019 Model Years

<table>
<thead>
<tr>
<th>Fuel Property&lt;sup&gt;(a)&lt;/sup&gt;</th>
<th>Limit</th>
<th>Test Method&lt;sup&gt;(b)&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Octane (R+M)/2</td>
<td>91 (min)</td>
<td>D 2699-88, D 2700-88</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>7.5 (min)</td>
<td>D 2699-88, D 2700-88</td>
</tr>
<tr>
<td>Lead</td>
<td>0-0.01g/gal (max); no lead added</td>
<td>§2253.4(c), title 13 CCR</td>
</tr>
<tr>
<td>Distillation Range:</td>
<td></td>
<td>§2263, title 13 CCR&lt;sup&gt;(c)&lt;/sup&gt;</td>
</tr>
<tr>
<td>10% point</td>
<td>130-150 °F</td>
<td></td>
</tr>
<tr>
<td>50% point</td>
<td>200-210 °F</td>
<td></td>
</tr>
<tr>
<td>90% point</td>
<td>290-300 °F</td>
<td></td>
</tr>
<tr>
<td>EP, maximum</td>
<td>390 °F</td>
<td></td>
</tr>
<tr>
<td>Residue</td>
<td>2.0 vol. % (max)</td>
<td></td>
</tr>
<tr>
<td>Sulfur</td>
<td>30-40 ppm by wt.</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>0.005 g/gal (max)</td>
<td>§2253.4(c), title 13 CCR</td>
</tr>
<tr>
<td>RVP</td>
<td>6.7-7.0 psi</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Olefins</td>
<td>4.0-6.0 vol. %</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Total Aromatic Hydrocarbons</td>
<td>22-25 vol. %</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Benzene</td>
<td>0.8-1.0 vol. %&lt;sup&gt;(d)&lt;/sup&gt;</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Multi-substituted Alkyl Aromatic Hydrocarbons</td>
<td>12-14 vol. %&lt;sup&gt;(e)&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>MTBE</td>
<td>10.8-11.2 vol. %</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Additives</td>
<td>Sufficient to meet requirements of §2257, title 13 CCR</td>
<td></td>
</tr>
<tr>
<td>Copper Corrosion</td>
<td>No. 1</td>
<td>D 130-88</td>
</tr>
<tr>
<td>Gum, washed</td>
<td>3.0 mg/100 mL (max)</td>
<td>D 381-86</td>
</tr>
<tr>
<td>Oxidation Stability</td>
<td>1000 minutes (min)</td>
<td>D 525-88</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>Report [b]</td>
<td></td>
</tr>
<tr>
<td>Heat of Combustion</td>
<td>Report [b]</td>
<td></td>
</tr>
<tr>
<td>Carbon</td>
<td>Report wt. % [b]</td>
<td></td>
</tr>
<tr>
<td>Hydrogen</td>
<td>Report wt. % [b]</td>
<td></td>
</tr>
</tbody>
</table>

[a] The gasoline must be blended from typical refinery feedstocks.
[b] ASTM specification unless otherwise noted. A test method other than that specified may be used following a determination by the Executive Officer that the other method produces results equivalent to the results with the specified method.
[c] Although §2263, title 13, CCR refers to the temperatures of the 50 and 90 percent points, this procedure can be extended to the 10 percent and end point temperatures, and to the determination of the residue content.
[d] The range for interlaboratory testing is 195-215°F.
[e] The range for interlaboratory testing is 285-305°F.
[f] The range for interlaboratory testing is 0.7-1.1 percent by volume.
[h] The fuel producer should report this fuel property to the fuel purchaser. Any generally accepted test method may be used and shall be identified in the report.

(b)(2) Certification Gasoline Fuel Specifications for the 2020 and Subsequent Model Years.

For 2020 and subsequent model engines, gasoline having the specifications listed below shall be used in exhaust and evaporative emission testing and the Executive Officer shall conduct exhaust and evaporative emission testing with gasoline having the specifications listed below.

### California Certification Gasoline Specifications for the 2020 and Subsequent Model Years

<table>
<thead>
<tr>
<th>Fuel Property (a)</th>
<th>Limit</th>
<th>Test Method (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Octane (R+M)/2 (i)</td>
<td>87-88.4; 91 (min)</td>
<td>D 2699-88, D 2700-88</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>7.5 (min)</td>
<td>D 2699-88, D 2700-88</td>
</tr>
<tr>
<td>Lead</td>
<td>0-0.01 g/gal (max); no lead added</td>
<td>§2253.4(c), title 13 CCR</td>
</tr>
<tr>
<td>Distillation Range:</td>
<td>§2263, title 13 CCR (c)</td>
<td></td>
</tr>
<tr>
<td>10% point</td>
<td>130-150 °F</td>
<td></td>
</tr>
</tbody>
</table>

As Amended: March 22, 2012
Date of Hearing: January 26-27, 2012
The gasoline must be blended from typical refinery feedstocks.

ASTM specification unless otherwise noted. A test method other than that specified may be used following a determination by the Executive Officer that the other method produces results equivalent to the results with the specified method.

Although §2263, title 13, CCR refers to the temperatures of the 50 and 90 percent points, this procedure can be extended to the 10 percent and end point temperatures, and to the determination of the residue content.

The range for interlaboratory testing is 195-215°F.

The range for interlaboratory testing is 285-305°F.

The range for interlaboratory testing is 0.7-1.1 percent by volume.


The fuel producer should report this fuel property to the fuel purchaser. Any generally accepted test method may be used and shall be identified in the report.

<table>
<thead>
<tr>
<th>Property</th>
<th>Requirement</th>
<th>Source/Other Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>50% point</td>
<td>205-215°F</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>90% point</td>
<td>310-320°F</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>EP, maximum</td>
<td>390°F</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Residue</td>
<td>2.0 vol. % (max)</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Sulfur</td>
<td>8-11 ppm by wt.</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>0.005 g/gal (max)</td>
<td>§2253.4(c), title 13 CCR</td>
</tr>
<tr>
<td>RVP</td>
<td>6.9-7.2 psi</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Olefins</td>
<td>4.0-6.0 vol. %</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Total Aromatic Hydrocarbons</td>
<td>19.5-22.5 vol. %</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Benzene</td>
<td>0.6-0.8 vol. %</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Multi-substituted Alkyl Aromatic Hydrocarbons</td>
<td>13-15 vol. %</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>MTBE</td>
<td>0.05 vol. %</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Ethanol</td>
<td>9.8-10.2 vol. %</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Total Oxygen</td>
<td>3.3-3.7 wt. %</td>
<td>§2263, title 13 CCR</td>
</tr>
<tr>
<td>Additives</td>
<td>Sufficient to meet requirements of §2257, title 13 CCR</td>
<td></td>
</tr>
<tr>
<td>Copper Corrosion</td>
<td>No. 1</td>
<td>D 130-88</td>
</tr>
<tr>
<td>Gum, washed</td>
<td>3.0 mg/100 mL (max)</td>
<td>D 381-86</td>
</tr>
<tr>
<td>Oxidation Stability</td>
<td>1000 minutes (min)</td>
<td>D 525-88</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>Report (h)</td>
<td></td>
</tr>
<tr>
<td>Heat of Combustion</td>
<td>Report (h)</td>
<td></td>
</tr>
<tr>
<td>Carbon</td>
<td>Report wt. % (h)</td>
<td></td>
</tr>
<tr>
<td>Hydrogen</td>
<td>Report wt. % (h)</td>
<td></td>
</tr>
</tbody>
</table>
For vehicles/engines that require the use of premium gasoline as part of their warranty, the Octane \((\text{R+M}/2)\) shall be a 91 minimum. All other certification gasoline specifications, as shown in this table, must be met. For all other vehicles/engines, the Octane \((\text{R+M}/2)\) shall be 87-88.4.


1. Delete subparagraph (a) and replace with the following:

(a)(1)  Exhaust emission test fuel. For dedicated, dual-fueled or hybrid electric vehicles which use natural gas, fuel used for exhaust and evaporative emission testing shall meet the specifications listed in section 2292.5, title 13, CCR, (Specifications for Compressed Natural Gas) as modified by the following:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td>(90.0 \pm 1.0) mole percent</td>
</tr>
<tr>
<td>Ethane</td>
<td>(4.0 \pm 0.5) mole percent</td>
</tr>
<tr>
<td>(C_3) and higher hydrocarbon content</td>
<td>(2.0 \pm 0.3) mole percent</td>
</tr>
<tr>
<td>Oxygen</td>
<td>(0.5) mole percent maximum</td>
</tr>
<tr>
<td>Inert gases ((\text{CO}_2 + \text{N}_2))</td>
<td>(3.5 \pm 0.5) vol. percent</td>
</tr>
</tbody>
</table>

(a)(2)  Mileage accumulation fuel. For dedicated, dual-fueled or hybrid electric vehicles which use natural gas, fuel used for service accumulation shall meet the specifications listed in section 2292.5, title 13, CCR (Specifications for Compressed Natural Gas).

2. Subparagraphs (b) through (d). [No change.]


1. Delete subparagraph (a) and replace with the following:

(a)(1)  Evaporative and exhaust emission test fuel. For dedicated, dual-fueled or hybrid electric vehicles which use liquefied petroleum gas, fuel used for exhaust and evaporative emission testing shall meet the specifications listed in title 13, CCR, section 2292.6 (Specifications for Liquefied Petroleum Gas) as modified by the following:
Liquefied Petroleum Gas Certification Test Fuel

<table>
<thead>
<tr>
<th>Specification</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propane</td>
<td>93.5 ± 1.0 volume percent</td>
</tr>
<tr>
<td>Propene</td>
<td>3.8 ± 0.5 volume percent</td>
</tr>
<tr>
<td>Butane and heavier components</td>
<td>1.9 ± 0.3 volume percent</td>
</tr>
</tbody>
</table>

(a)(2) Mileage accumulation fuel. For dedicated, dual-fueled or hybrid electric vehicles which use liquefied petroleum gas, fuel used for service accumulation shall meet the specifications listed in title 13, CCR, section 2292.6 (Specifications for Liquefied Petroleum Gas).

(a)(3) The specification range of the fuels to be used in this section (a) shall be measured in accordance with ASTM D2163-91 and reported in accordance with §86.094-21.

2. Subparagraphs (b) through (d). [No change.]


Subpart I – Testing with Oxygenated Fuels.


Subpart K – Definitions and Other Reference Information.

1. Amend the definition of “Designated Compliance Officer” as follows:

   Designated Compliance Officer means the Executive Officer of the Air Resources Board or a designee of the Executive Officer.

1065.1005 Symbols, abbreviations, acronyms, and units of measure. September 15, 2011.