

State of California
AIR RESOURCES BOARD

FINAL
OPTIONAL LOW NOX EMISSION STANDARD AMENDMENTS TO

**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
Amended: December 6, 2012
Amended: April 18, 2013 (Corrected by Section 100)
Amended: October 21, 2014

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 on April 18, 2013. [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 “* * *”.

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

The following provisions of Subparts A, N, and P, Part 86, Title 40, Code of Federal Regulations (“CFR”), as adopted or amended by the U.S. Environmental Protection Agency on the date set forth next to the 40 CFR Part 86 section listed below, and only to the extent they pertain to the testing and compliance of exhaust emissions from heavy-duty Otto-cycle engines, are adopted and incorporated herein by this reference as the “California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines,” with the following exceptions and additions.

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

Subpart A - General Provisions for Emission Regulations for 1977 and Later Model Year New Light-Duty Vehicles, Light-Duty Trucks and Heavy-Duty Engines, and for 1985 and Later Model Year New Gasoline-Fueled, Natural Gas-Fueled, Liquefied Petroleum Gas-Fueled and Methanol-Fueled Heavy Duty Vehicles

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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.

1. §86.004-2. January 18, 2001.
2. §86.010-2. February 24, 2009.

B. California provisions.

“**Administrator**” means the Executive Officer of the Air Resources Board.

“**Certificate of Conformity**” means “Executive Order” certifying vehicles for sale in California.

“**Certification**” means certification as defined in Section 39018 of the Health and Safety Code.

“**EPA**” means “Air Resources Board” or the Executive Officer of the Air Resources Board.

“**EPA Enforcement Officer**” means the Executive Officer of the Air Resources Board or his delegate.

“**Medium-Duty Engine**” means a heavy-duty engine that is used in a medium-duty vehicle.

“**Medium-Duty Vehicle**” means any 1992 through 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.

“Optional Low NOx Engine” means a 2015 or subsequent model heavy-duty Otto-cycle engine certified to the optional low NOx emission standards, which are below the 0.20 g/bhp-hr emission standard for 2007 and subsequent model engines.

The optional low NOx emission standards are 0.10, 0.05, or 0.02 g/bhp-hr.

Warranty means the warranty provisions set forth in title 13, California Code of Regulations §2036.

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

A. Federal provisions.

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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^A
(in g/bhp-hr)**

Model Year	Emission Category	NMHC + NOx	NMHC	NOx	CO ^H	HCHO	PM
Standards for Heavy-Duty Otto-Cycle Engines Used In 2004 through 2019 Model Medium-Duty Vehicles 8,501 to 10,000 pounds GVW^B and 2004 and Subsequent Model Medium-Duty Vehicles 10,001 to 14,000 pounds GVW^C							
2004	ULEV	2.4 or 2.5 with 0.5 NMHC cap ^D	n/a	n/a	14.4	0.05	n/a
	SULEV	2.0	n/a	n/a	7.2	0.025	n/a
2005 through 2007 ^F	ULEV	1.0 ^{D,F}	n/a	n/a	14.4	0.05	n/a
	SULEV	0.5 ^{D,F}	n/a	n/a	7.2	0.025	n/a
2008 and subsequent ^G	ULEV	n/a	0.14 ^F	0.20 ^F	14.4	0.01	0.01
	SULEV	n/a	0.07 ^F	0.10 ^F	7.2	0.005	0.005
Standards for Heavy-Duty Otto-Cycle Engines Used In Heavy-Duty Vehicles Over 14,000 pounds GVW							
2004	n/a	2.4 or 2.5 with 0.5 NMHC cap ^D	n/a	n/a	37.1	0.05 ^E	n/a
2005 through 2007 ^F	n/a	1.0 ^{C,ED,F}	n/a	n/a	37.1	0.05 ^E	n/a
2008 and subsequent ^G	n/a	n/a	0.14 ^F	0.20 ^{EE}	14.4	0.01	0.01
<u>2015 and subsequent^I</u>	<u>Optional</u>	<u>n/a</u>	<u>0.14</u>	<u>0.10, 0.05, or 0.02</u>	<u>14.4</u>	<u>0.01</u>	<u>0.01</u>

^A 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.

^B 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.

^C 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 specify, in the Part I application for certification, an in-use compliance test procedure, as provided in section 2139(c), title 13 CCR.

^D 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.

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

^F 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).

^G 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.

^H 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.

^I Optional Low NOx Emission Standards from Heavy Duty Engines. Manufacturers may choose to produce heavy duty engines that emit less NOx emissions than standard 0.20 g/bhp-hr engines. A manufacturer may not include an engine family certified to the optional NOx emission standards in the ABT programs for NOx but may include it for NMHC.

2. Optional Standards for Complete and Incomplete Heavy-Duty Vehicles.

Manufacturers may request to group complete and incomplete 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 and incomplete heavy-duty Otto-cycle vehicles meet the most stringent LEV III standards to which any vehicle within that test group certifies.

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15. NOx and particulate averaging, trading, and banking for heavy-duty engines. [§86.xxx-15.]

A. Federal provisions.

1. §86.004-15. October 6, 2000. [No change.]
2. §86.007-15. January 18, 2001. Amend as follows:
 - 2.1 Subparagraphs (a) through (m)(2): [No change.]
 - 2.2 Subparagraph (m)(3): Delete.
 - 2.3 Subparagraphs (m)(4) through m(10). [No change.]

B. California provisions.

1. A manufacturer may not include an engine family certified to the optional NOx emission standards in the ABT programs for NOx but may include it for NMHC.

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35. Labeling. [§86.xxx-35]

A. Federal provisions.

1. §86.001-35. April 6, 1994.
 - 1.1 Add the following sentence to the introductory paragraph: The labeling requirements of this section shall apply to all new motor vehicle engines certified according to the provisions of California Health and Safety Code Section 43100.

2. §86.007-35. August 30, 2006. [No change, except as noted above for §86.001-35.]

B. California Provisions

1. For 2004 through 2007 model year engines certified to the optional standards in §86.005-10(f) the following statement shall also be printed on the label, "This engine conforms to the California ULEV standards applicable to 20XX model year Heavy-Duty Otto-Cycle Engines."

2. For 2015 and subsequent model year Otto- cycle engines certified to the Optional Low NOx Engine emission standards, the label shall contain the following statement: "This engine conforms to California regulations applicable to XXXX model year heavy-duty Otto-cycle engines and is certified to the Optional Low NOx Engine emission standard of XXX g/bhp-hr."

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