

State of California
AIR RESOURCES BOARD

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

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
Amended: September 2, 2015
Amended: September 1, 2017
Amended: December 19, 2018
Amended: September 9, 2021

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.¹ 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); (these test procedures are referred below as “evap. TPs”)
2. Warranty requirements (sections 2035, et seq., title 13, CCR);
3. Warranty requirements (sections 2036, et seq., title 13, CCR);
4. OBD II (sections 1968, et seq., title 13, CCR, as applicable);
5. HD OBD (sections 1971, et seq., title 13, CCR, as applicable);
6. “California Test Procedures for Evaluating Substitute Fuels and New Clean Fuels through 2014,” (incorporated by reference in section 2317, title 13, CCR); and
7. “California Test Procedures for Evaluating Substitute Fuels and New Clean Fuels in 2015 and Subsequent Years,” (incorporated by reference in (section 2317, title 13, CCR).

¹ The requirements for Otto-cycle engines used in complete vehicles up to 14,000 pounds GVW are contained in the “California 2001 through 2014 Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 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 and 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.

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PROCEDURES FOR 2004 AND SUBSEQUENT MODEL
HEAVY-DUTY OTTO-CYCLE ENGINES AND VEHICLES**

The following provisions of Subparts A, N, and P, Part 86, of Subparts A through I, Part 1036, of Subparts A through L, Part 1065, and of Subparts A and E, Part 1068, 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 and Vehicles,” with the following exceptions and additions.

**PART 86 – CONTROL OF EMISSIONS FROM NEW AND IN-USE HIGHWAY
VEHICLES AND ENGINES**

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

§86.1 Incorporation by reference. October 25, 2016.

Subpart A - General Provisions for Heavy-Duty Engines and Heavy-Duty Vehicles.

1. General Applicability. **[§86.xxx-1]**
 - A. **Federal Provisions.**
 1. §86.001-1. October 6, 2000.
 - 1.1 Subparagraph (a). [No change.]
 - 1.2 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 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 2009 through 2016 Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles,” incorporated herein by reference. Heavy-duty engine or vehicle provisions of subpart A do not apply to such a vehicle.
 - 1.3 Subparagraph (c). [n/a (ADP for LDVs)]
 - 1.4 Subparagraph (d). [n/a (NLEVs)]
 - 1.5 Amend subparagraph (e) as follows: *Small volume manufacturers.* Special certification procedures are available for any manufacturer whose projected or actual combined California sales of passenger cars, light-duty

trucks, medium-duty vehicles, heavy-duty vehicles and heavy-duty engines in its product line are fewer than 4,500 units based on the average number of vehicles sold for the three previous consecutive model years for which a manufacturer seeks certification. For a manufacturer certifying for the first time in California, model-year production shall be based on projected California sales. The small volume manufacturer's heavy-duty engine certification procedures are described in 40 CFR §86.098-14.

1.6 Subparagraph (f). [n/a; exhaust opacity refers to diesel engines.]

2. §86.005-1 October 6, 2000.

2.1 Subparagraph (a). [No change.]

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 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.

2.3 Subparagraph (c). [No change.]

2.4 Subparagraph (d). [Reserved.]

2.5 Amend subparagraph (e) as follows: *Small volume manufacturers.* Special certification procedures are available for any manufacturer whose projected or actual combined California sales of passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles and heavy-duty engines in its product line are fewer than 4,500 units based on the average number of vehicles sold for the three previous consecutive model years for which a manufacturer seeks certification. For a manufacturer certifying for the first time in California, model-year production shall be based on projected California sales. The small volume manufacturer's heavy-duty engine certification procedures are described in 40 CFR §86.098-14.

2.6 Subparagraph (f). [n/a; exhaust opacity refers to diesel engines.]

3. §86.016-1 October 25, 2016.

3.1 Subparagraph (a). Amend as follows:

3.1.1 Subparagraph (1). [No change.]

3.1.2 Subparagraphs (2) and (3). Delete 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 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.

3.1.3 Subparagraph (4). Delete and replace with the following: The provisions of this subparagraph are contained the “California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles.”

3.1.4 Subparagraph (5). Delete and replace with the following: All heavy-duty engines and vehicles are subject to the on-board diagnostic system requirements in section 1968 et seq., title 13, CCR, as applicable.

3.2 Subparagraph (b). [No change.]

3.3 Subparagraph (c). *Greenhouse gas emission standards.* Delete and replace with the following: See 40 CFR parts 1036 and 1037 for greenhouse gas emission standards that apply for heavy-duty engines and vehicles, as modified by these test procedures.

3.4 Subparagraph (d). *Non-petroleum fueled vehicles.* Delete and replace with the following: The standards and requirements of this part apply to non-petroleum fueled motor vehicles, as described in subsection B. of this section.

3.5 Amend subparagraph (e) as follows: *Small volume manufacturers.* Special certification procedures are available for any manufacturer whose projected or actual combined California sales of passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles and heavy-duty engines in its product line are fewer than 4,500 units based on the average number of vehicles sold for the three previous consecutive model years for which a manufacturer seeks certification. For a manufacturer certifying for the first time in California, model-year production shall be based on projected California sales. To certify its product line under these optional procedures, the small volume manufacturer must first obtain the Executive Officer’s approval. The manufacturer must meet the eligibility criteria specified in 40 CFR §86.094-14(b) before the Executive Officer’s approval will be granted. The small volume manufacturer’s heavy-duty engine certification procedures are described in 40 CFR §86.098-14.

3.6 Subparagraph (f). [n/a; exhaust opacity refers to diesel engines.]

3.7 Subparagraph (g). [n/a; alternative fuel conversions.]

3.8 Subparagraph (h). [No change.]

B. California provisions.

1. These regulations are applicable to all heavy-duty Otto-cycle methanol-fueled, ethanol-fueled, natural-gas-fueled and liquefied-petroleum-gas-fueled dedicated, dual-fuel and multi-fuel engines (and vehicles) except those engines derived from existing diesel engines. For any engine which is not a distinctly Otto-cycle engine nor derived from such, the Executive Officer shall determine whether the engine shall be subject to these regulations or alternatively to the heavy-duty diesel engine regulations, in consideration of the relative similarity of the engine's torque-speed characteristics and vehicle applications with those of Otto-cycle and diesel engines. Reference to dual-fuel vehicles or engines shall also mean bi-fuel vehicles or engines. For guidance on classifying 2021 and subsequent model heavy heavy-duty Otto-cycle engines, used in vehicles which normally exceed 33,000 pounds GVWR, based on primary intended service class, see 40 CFR §1036.140.

2. References in the federal regulations to light-duty vehicles and light-duty trucks do not apply.

3. Any reference to vehicle sales throughout the United States shall mean vehicles and engines sales in California. Any reference to small volume manufacturer shall mean a California small-volume manufacturer as defined in section I.1.A., above.

4. Regulations concerning U.S. EPA hearings, U.S. EPA inspections, specific language on the Certificate of Conformity, evaporative emissions, high-altitude vehicles and testing, particulate and oxides of nitrogen averaging and test group standards applicable in such averaging, alternative useful life, selective enforcement audit, and Certification Short Test shall not be applicable to these procedures, except where specifically noted. The regulations pertaining to evaporative emissions are contained in "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," as incorporated in §1976, title 13, CCR.

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. October 25, 2016.

1.1 Introductory text and definitions "*Ambulance*" through "*U.S.-directed production*." [No change.]

1.2 Amend "*Useful Life*" definition as follows:

1.2.1 Subparagraphs (1) through (2). [n/a]

1.2.2 Delete and replace subparagraph (3) as follows:

(3) For an Otto-cycle HDE family:

(i) For 2004 through 2026 model-year heavy-duty Otto-cycle engines, except 2024 through 2026 model-year engines used in medium-duty vehicles with a GVWR from 10,001 to 14,000 pounds, for carbon monoxide, particulate, oxides of nitrogen, and non-methane hydrocarbons emission standards, a period of use of 10 years or 110,000 miles, whichever first occurs.

(ii) For 2027 through 2030 model-year heavy-duty Otto-cycle engines used in heavy-duty vehicles with a GVWR greater than 14,000 pounds, for carbon monoxide, particulate, oxides of nitrogen, and non-methane hydrocarbons emission standards, a period of use of 12 years or 155,000 miles, whichever first occurs.

(iii) For 2031 and subsequent model-year heavy-duty Otto-cycle engines used in heavy-duty vehicles with a GVWR greater than 14,000 pounds, for carbon monoxide, particulate, oxides of nitrogen, and non-methane hydrocarbons emission standards, a period of use of 15 years or 200,000 miles, whichever first occurs.

(iv) For 2024 and subsequent model Otto-cycle engines used in medium-duty vehicles with a GVWR from 10,001 to 14,000 pounds, for carbon monoxide, particulate, oxides of nitrogen, and non-methane hydrocarbons emission standards, a period of use of 15 years or 150,000 miles, whichever first occurs.

1.2.3 Subparagraph (4) [n/a]

1.2.4 Subparagraph (5). [No change.]

1.2.5 Add subparagraph (6) as follows:

(6) For 2022 and subsequent model year Otto-cycle hybrid powertrains optionally certified pursuant to title 13, CCR, section 1956.8, used in heavy-duty vehicles with a GVWR greater than 14,000 pounds, the useful life periods and model year implementation schedules in subparagraph (3) of this section shall apply to the Otto-cycle hybrid powertrains. For 2022 through 2023 model year Otto-cycle hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds, the useful life periods and model year implementation schedules for heavy-duty Otto-cycle engines in subparagraph (3)(i) of this section, and for 2024 and subsequent model year Otto-cycle hybrid powertrains used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds, the useful life periods and model year implementation schedules for Otto-cycle engines in subparagraph (3)(iv) of this section, shall apply to the Otto-cycle hybrid powertrains.

- 1.3 Delete and replace “Warranty period” definition as follows:

Warranty period [For guidance see title 13, CCR, §2036].

2. §86.010-2. February 24, 2009.
3. §86.012-2. September 15, 2011.

3.1 Amend paragraph as follows: The definitions of 40 CFR §86.010-2 continue to apply to model year 2010 and later model year engines and vehicles. The definitions listed in this section apply beginning with model year 2012. “GHG Urban Bus” means a passenger-carrying vehicle with a load capacity of fifteen or more passengers and intended primarily for intracity operation, i.e. , within the confines of a city or greater metropolitan area. GHG urban bus operation is characterized by short rides and frequent stops. To facilitate this type of operation, more than one set of quick-operating entrance and exit doors would normally be installed. Since fares are usually paid in cash or tokens, rather than purchased in advance in the form of tickets, GHG urban buses would normally have equipment installed for collection of fares. GHG urban buses are also typically characterized by the absence of equipment and facilities for long distance travel, e.g., rest rooms, large luggage compartments, and facilities for stowing carry-on luggage.

B. California Provisions.

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

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

“**California sales volume**” means the number of new California certified engines, vehicles or powertrains sold to an ultimate purchaser in the State of California in a given model year.

“**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.

“**Class 3**” means a vehicle with a GVWR that is above 10,000 pounds but at or below 14,000 pounds.

“**Class 4**” means a vehicle with a GVWR that is above 14,000 pounds but at or below 16,000 pounds.

“**Class 5**” means a vehicle with a GVWR that is above 16,000 pounds but at or below 19,500 pounds.

“**Class 6**” means a vehicle with a GVWR that is above 19,500 pounds but at or below 26,000 pounds.

“**Class 7**” means a vehicle with a GVWR that is above 26,000 pounds but at or below 33,000 pounds.

“**Class 8**” means a vehicle with a GVWR that is above 33,000 pounds.

“Conformity factor” means a multiplier to the emission standards used for in-use compliance testing with PEMS.

“Designated Compliance Officer” means the Executive Officer of the Air Resources Board or his or her delegate.

“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 or her delegate.

“Family certification level or FCL” means the family certification level as described in section 1036.801 of these test procedures.

“Field fix” means a modification, removal or replacement of an emission-related component by a manufacturer or dealer, or revision by a manufacturer for implementation by dealers to specifications or maintenance practices for emission-related components on engines that have left the assembly line.

“Heavy-Duty Transient Federal Test Procedure” or “FTP cycle” means the test procedure specified in 40 CFR §86.008-10(a)(2), as amended on Oct. 25, 2016, for heavy-duty Otto-cycle engines.

“In-use threshold” means the value of the emission standards multiplied by a conformity factor.

“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 primary NOx emission standard applicable for that model year.

“Optionally certified hybrid powertrain or hybrid powertrain or heavy-duty hybrid powertrain” means a group of components that includes an engine, electric motor-generator system, rechargeable energy storage system other than a conventional battery system or conventional flywheel, battery management system, including charge controller and thermal management systems and associated power electronics. Transmissions, final drives and drive shafts may be included as powertrain components if specified by the hybrid powertrain manufacturer. Supplemental electrical batteries and hydraulic accumulators are examples of hybrid energy storage systems. Note other examples of systems that qualify as hybrid engines or powertrains are systems that recover kinetic energy and use it to power an electric heater in the aftertreatment.

“Optionally certified Otto-cycle hybrid powertrain or Otto-cycle hybrid powertrain or heavy-duty Otto-cycle hybrid powertrain” means a hybrid powertrain that uses an Otto-cycle engine.

“Portable emission measurement system (PEMS)” means a measurement system consisting of portable equipment that can be used to generate brake-specific emission measurements during field testing or laboratory testing.

“Running change” means a change to a vehicle/engine or addition of a model which occurs after certification but during vehicle/engine production.

“Vehicle family” has the same definition as “vehicle family” in 40 CFR §1037.801, last amended on March 10, 2021 (Pre-publication).

“Vehicle-FTP” means the vehicle FTP cycle as defined in Appendix II to part 1036 paragraph (b) of these test procedures.

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

“Zero-emission vehicle” means an on-road vehicle with a drivetrain that produces zero exhaust emission of any criteria pollutant (or precursor pollutant) or greenhouse gas under any possible operational modes or conditions.

3. Abbreviations. [§86.xxx-3]

A. Federal provisions.

1. §86.000-3. October 22, 1996. All federal abbreviations apply, except as otherwise noted below. Abbreviations specific to other requirements are contained in those separate documents.

B. California provisions.

CA-ABT means California averaging, banking and trading program as described in Section I.15.B.2 of these test procedures

CCR means California Code of Regulations

LEV means low-emission vehicle

MAW means Moving Average Window as described in section 86.1370.B of these test procedures

ULEV means ultra-low-emission vehicle

SULEV means super-ultra-low-emission vehicle

MDV means medium-duty vehicle

4. Section numbering; construction.

§86.084-4. October 25, 2016. [No change.]

The section numbering convention employed in these test procedures, in order of priority, is I.1.A.1.1. in order to distinguish California procedures and requirements from those of the U.S. EPA. References in these test procedures to specific sections of the Code of Federal Regulations maintain the same numbering system employed in the Code of Federal Regulations. California-only requirements are set forth in a separate

subsection. In the beginning of each section the generic notation §86.xxx-1 is used when there is more than one applicable section (or when no versions of the section are being incorporated) to indicate the section being discussed without regard to model year. The years of applicability (denoted generically by “xxx”) are added as applicable in the pertinent subsections.

In cases where the entire CFR section is incorporated by reference with no modifications, the notation “[No change.]” is used. In cases where the federal requirements are modified by California requirements, the notation “Amend (or delete) subparagraph (___) as follows:” is used. If the federal requirement is not applicable, the notation “[n/a]” is used. In cases where there are California only requirements, the additional California requirements are noted in a separate subsection with the numbering convention set forth above.

If a CFR section for a specific model year is set forth in this document, and that CFR section references previous CFR sections, then all previously referenced CFR sections are deemed incorporated into this document unless otherwise noted.

5. General Standards; increase in emissions; unsafe conditions. [§86.090-5] November 12, 1996. [No change.]
6. Hearings on certification. **[§86.078-6]** October 25, 2016.
Amend the paragraph as follows: If a manufacturer's request for a hearing is approved, ARB will follow the hearing procedures specified in accordance with title 17, CCR, §60055.1, et seq., with respect to such issue.
7. Maintenance of records; submittal of information; right of entry. [§86.000-7] October 25, 2016. [No change.]
8. Emission standards for light-duty vehicles. [§86.xxx-8] [n/a]
9. Emission standards for light-duty trucks. [§86.xxx-9] [n/a]
10. Emission standards for Otto-cycle heavy-duty engines and vehicles. **[§86.xxx-10]**
 - A. **Federal provisions.**
 1. **§86.098-10.** April 30, 2010. Amend as follows:
 - 1.1 Amend subparagraph (a) as follows:
 - 1.1.1 Delete subparagraph (a)(1) and replace with emission standards set forth in Section I.10.B below.]
 - 1.1.2 Subparagraph (a)(2). [No change.]
 - 1.1.3 Subparagraph (a)(3). [No change.]
 - 1.2 Subparagraph (b) [n/a] [See evap TPs]
 - 1.3 Subparagraph (c) [No change.]

- 1.4 Subparagraph (d) [No change.]
- 2. **§86.099-10.** [n/a; See evap TPs.]
- 3. **§86.005-10.** April 28, 2014. Amend as follows:
 - 3.1 Subparagraph (a): [No change.]
[See, also emission standards in I.10.B below]
 - 3.2 Subparagraph (b) [n/a] [See evap TPs]
 - 3.3 Subparagraph (c) [No change.]
 - 3.4 Subparagraph (d) [No change.]
 - 3.5 Subparagraph (e) [No change.]
 - 3.6 Subparagraph (f) [No change.]
- 4. **§86.008-10.** October 25, 2016. Amend as follows:
 - 4.1 Subparagraph (a): [See, also emission standards in I.10.B below]
 - 4.1.1. Amend subparagraph (a)(1) as follows: Exhaust emissions from new 2007 through 2023 model year Otto-cycle HDEs shall not exceed the following. Exhaust emissions from new 2024 and subsequent model year Otto-cycle HDEs are specified in subparagraph I.10.B, below.
 - 4.1.2 Subparagraphs (a)(1)(i) through (a)(1)(ii)(A). [No change.]
 - 4.1.3. Amend subparagraph (a)(1)(ii)(B) as follows: Nonmethane-hydrocarbon (NMHC) for engines fueled with natural gas or liquefied petroleum gas. 0.14 grams per brake horsepower-hour (0.052 grams per megajoule).
 - 4.1.4. Subparagraphs (a)(1)(ii)(C) through (a)(4). [No change.]
 - 4.2 Subparagraph (b) [n/a] [See evap TPs]
 - 4.3 Subparagraph (c) [No change.]
 - 4.4 Subparagraph (d) [No change.]
 - 4.5 Subparagraph (e) [No change.]
 - 4.6 Subparagraph (f) [No change.]
 - 4.7 Subparagraph (g) [No change.]

B. California provisions.

- 1. Exhaust emissions from new 2004 through 2023 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 through 2023 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 through 2023 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 through 2023 ^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 2008 through 2023 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 ^{D,F}	n/a	n/a	37.1	0.05 ^E	n/a
2008 and subsequent through 2023 ^G	n/a	n/a	0.14 ^F	0.20 ^F	14.4	0.01	0.01
2015 and subsequent through 2021 ^I	Optional	n/a	0.14	0.10, 0.05, or 0.02	14.4	0.01	0.01
2022 through 2023 ^I	Optional	n/a	0.14	0.10, 0.05, 0.02, or 0.01	14.4	0.01	0.01

^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 through 2023 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 2023 and earlier model year 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.

3. Exhaust Emission Standards for 2024 and Subsequent Model Otto-Cycle Heavy-Duty Engines

3.1 The exhaust emissions from new 2024 and subsequent model Otto-cycle heavy-duty engines used in vehicles over 14,000 pounds GVWR and Otto-cycle engines used in incomplete medium-duty vehicles 10,001 to 14,000 pounds GVWR, shall not exceed:

Exhaust Emission Standards for 2024 and Subsequent Model Otto-Cycle Heavy-Duty Engines, and Otto-Cycle Engines Used in Incomplete Medium-Duty Vehicles 10,001 to 14,000 Pounds GVWR (in g/bhp-hr)^A

Test Procedure	Model Year	NOx	NMHC	CO	HCHO	PM
FTP Cycle	2024 - 2026	0.050	0.14	14.4	0.01	0.005
FTP Cycle	2027 and Subsequent	0.020	0.14	14.4	0.01	0.005

^A 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 1961.2, 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. An engine certified for use in a medium-duty vehicle shall not be used in a heavy-duty vehicle over 14,000 pounds GVWR.

3.2. Optional Low NOx Emission Standards for 2024 and Subsequent Model Heavy-Duty Engines.

Manufacturers may elect to certify Otto-cycle heavy-duty engines used in vehicles over 14,000 pounds GVWR to the following optional low NOx emission standards in lieu of the primary NOx emission standards applicable for that model year. Engine families that are certified to the optional low NOx emission standards are not eligible for generating any NOx credits in the federal or California ABT programs.

**Optional Low NOx Exhaust Emission Standards for
2024 and Subsequent Model Otto-cycle Heavy-Duty Engines
(g/bhp-hr)^A**

Test Procedure	Model Year	NOx	NMHC	CO	HCHO	PM
FTP cycle	2024 - 2026	0.010 or 0.020	0.14	14.4	0.01	0.005
FTP cycle	2027 and Subsequent	0.010	0.14	14.4	0.01	0.005

^A A manufacturer may not include an engine family certified to the optional NOx emission standard in the ABT programs for NOx but may include it for particulates.

4. Exhaust Emission Standards for 2022 and Subsequent Model Otto-Cycle Hybrid Powertrains Used In Hybrid Vehicles Over 14,000 pounds GVWR

For 2022 and subsequent model year Otto-cycle hybrid powertrains optionally certified pursuant to title 13, CCR, section 1956.8, used in heavy-duty vehicles with a GVWR greater than 14,000 pounds, the exhaust emissions and model year implementation schedules in this section for heavy-duty Otto-cycle engines used in vehicles over 14,000 pounds GVWR shall apply to the Otto-cycle hybrid powertrains.

For 2022 and subsequent model year Otto-cycle hybrid powertrains optionally certified pursuant to title 13, CCR, section 1956.8, used in incomplete vehicles from 10,001 to 14,000 pounds GVWR, the exhaust emission standards and model year implementation schedules applicable to the Otto-cycle engines used in incomplete vehicles from 10,001 to 14,000 pounds GVWR shall apply to the Otto-cycle hybrid powertrains in such vehicles.

5. For 2024 and subsequent model year heavy-duty engines, the brake-specific exhaust NMHC, CO, NOx, and PM emissions in g/bhp-hr, as determined under section 86.1370.B pertaining to the test procedures for the MAW method, shall not exceed the applicable emission standards, or FELs, specified in subsection I.10.B of these test procedures with the conformity factor applied.

11. Emission standards for heavy-duty diesel engines and vehicles. [§86.xxx-11] [n/a]
12. Alternative certification procedures. [§86.080-12]. April 17, 1980.
 - A. **Federal provisions.** [No change].
 - B. **California provisions.**
 - 1.1 Subparagraphs (a)(1) through (a)(4) [No change].
 - 1.2 Add subparagraph (a)(5) as follows:
 - (a)(5) **Optional Powertrain Certification Test Procedure for Otto-cycle Hybrid Powertrains for 2022 and Subsequent Model Year.** Manufacturers may elect to optionally certify Otto-cycle hybrid powertrains to applicable on-road heavy-duty Otto-cycle engine GHG emission standards and criteria pollutants emission standards pursuant to title 13, CCR, section 1956.8, using the powertrain test procedure pursuant to 40 CFR part 1036, subpart F and 40 CFR §1037.550 as amended March 10, 2021 (Pre-publication), which is incorporated by reference herein. An Otto-cycle hybrid powertrain certified under this optional powertrain certification test procedure shall be subject to all applicable emission standards, for on-road heavy-duty engines for any given model year. Except as otherwise noted, an Otto-cycle hybrid powertrain optionally certified pursuant to this section shall comply with all requirements applicable to on-road heavy-duty engines of this part, other referenced parts of the CFR, and title 13, CCR, section 1956.8, understanding “engine” to mean “hybrid powertrain” and “engine family” to mean “hybrid powertrain family”, including requirements for on-board diagnostic system as specified in title 13, CCR, sections 1968.2 and 1971.1 et seq, useful life as specified in Section I.2.A of these test procedures, emissions warranty as specified in title 13, CCR section 2036, and durability demonstration as specified in Section I.26 of these test procedures, and title 13, CCR, section 1956.8, as applicable.
13. Alternative durability program. [§86.xxx-13] [n/a]
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. October 25, 2016. Amend as follows:
 - 1.1 Subparagraphs (a) through (c)(1) [No change.]
 - 1.2 Amend subparagraph (c)(2) as follows: Small volume manufacturers shall include in their records all of the information that EPA

requires in 40 CFR §86.094-21. This information will be considered part of the manufacturer's application for certification. [The last sentence is deleted.]

1.3 Subparagraphs (c)(3) through (c)(3)(ii) [No change.]

1.4 Amend subparagraph (c)(3)(ii)(A) as follows: Manufacturers with aggregated sales of less than 301 motor vehicles and motor vehicle engines per year may use assigned deterioration factors that the Administrator determines and prescribes based on design specifications or sufficient control over design specifications, development data, in-house testing procedures, and in-use experience. [The remainder of the paragraph is the same.]

1.5 Subparagraph (c)(3)(ii)(B) through (c)(7)(i) [No change.]

1.6 Add the following sentence to subparagraph (c)(7)(ii): All running changes that do not adversely affect emissions or the emission control system durability shall be deemed approved unless disapproved by the Executive Officer within 30 days of the implementation of the running change.

1.7 Subparagraph (c)(8) [No change.]

2. §86.095-14. April 30, 2010. [No change.]

3. §86.098-14. April 6, 1994. [No change.]

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.

2. *California-only averaging, banking, and trading (CA-ABT) program* for 2022 and subsequent model years - For 2022 and subsequent model year California certified medium-duty engine families, heavy-duty engine families and optionally certified Otto-cycle hybrid powertrain families, manufacturers may begin participating in the California NOx and NMHC averaging, banking and trading program to show compliance with the standards in Section I.10 of these test procedures. For 2024 and subsequent model years, all manufacturers that certify products in California must enroll in the CA-ABT program. Heavy-duty zero-emission powertrain families can participate in the CA-ABT program subject to the provisions of subparagraph I.15.B.2.(i) of these test procedures. All CA-ABT calculations must be performed using the California sales volume.

(a) The CA-ABT program only includes the following two averaging sets. Medium-duty vehicles that are chassis certified under title 13, CCR, section 1961.2 are not eligible to participate in the CA-ABT program.

(1) The heavy-duty Otto-cycle averaging set only includes:

(i) Otto-cycle medium-duty engines certified to the standards and test procedures in title 13, CCR, sections 1956.8 (c) and (d),

(ii) Heavy-duty Otto-cycle engines certified to the standards and test procedures in title 13, CCR, sections 1956.8 (c) and (d), and

(iii) Optionally certified hybrid powertrain families certified to the standards and test procedure in title 13, CCR, sections 1956.8 (c)(5) and (d) used in class 4 through class 8 vehicles with Otto-cycle engines.

(iv) Optionally certified hybrid powertrain families certified to the standards and test procedure in title 13, CCR, sections 1956.8 (c)(5) and (d) used in incomplete vehicles with a GVWR from 10,001 to 14,000 pounds with Otto-cycle engines.

(2) The heavy-duty zero-emission averaging set as described in subparagraph B.2.i of this section.

(b) Transfer of credits between any averaging sets is prohibited with the following exception: credits from the heavy-duty zero-emission averaging set can be transferred into any other averaging set such as the heavy-duty Otto-cycle averaging set only to cover deficits generated by any certified engine families.

(c) Existing federal-ABT program credits generated during 2009 and previous model years cannot be transferred into or used in the CA-ABT program.

(d) As provided in this section, a portion of existing banked credits in the federal-ABT program that were generated from the 2010 through 2021 model years can be transferred into the CA-ABT program for the heavy-duty Otto-cycle averaging set during the 2022 model year, subject to the provisions in subparagraph B.2.(e) of this section. Manufacturers cannot otherwise transfer any other existing banked credits in the federal-ABT program to the CA-ABT program. Manufacturers that do not begin enrollment in the CA-ABT program in 2022 model year may not transfer any federal-ABT credits into the CA-ABT program.

(e) For the heavy-duty Otto-cycle averaging set specified in subparagraph B.2.(a) of this section, calculate the maximum allowance for the transfer of

federal-ABT credits to the CA-ABT program using the following equation:

$$\left(\begin{array}{c} \text{Maximum allowable credit} \\ \text{transfer to CA – ABT bank} \\ \text{in 2022 model year for} \\ \text{the heavy – duty Otto – cycle averaging set} \end{array} \right) = CR \times \left(\sum_{i=t_1}^{t_2} (CA)_i \right) \div \left(\sum_{i=t_1}^{t_2} (National)_i \right)$$

where:

t_1 = 2019 model year.

t_2 = 2021 model year.

CA_i = California sales volume of engines within the heavy-duty Otto-cycle averaging set in model year i .

$National_i$ = the number of engines produced for U.S. sales within the heavy-duty Otto-cycle averaging set in model year i .

CR = banked federal credits (in Mg) for the heavy-duty Otto-cycle averaging set generated in the 2010 to 2021 model year period.

(f) For determining credit availability or credit needs for engine families or optionally certified Otto-cycle hybrid powertrain families in the CA-ABT program:

$$Emission\ Credits = \left(Std - FEL \times \frac{MYUL}{AUL} \right) \times CF \times AUL \times Sales \times 10^{-6}$$

where:

Emission credits are calculated for each individual engine family or optionally certified Otto-cycle hybrid powertrain family in Megagrams (Mg).

Std = the current model year FTP cycle NO_x or NMHC emission standard in grams per brake horsepower hour. For example, the current model year FTP cycle NO_x emission standard for a 2025 model year engine family is 0.050 g/bhp-hr

FEL = the FTP cycle NO_x or NMHC family emission limit for

the engine family or optionally certified Otto-cycle engine hybrid powertrain family in grams per brake horsepower hour,

CF = the transient cycle conversion factor (in bhp-hr/mile) is the total (integrated) cycle brake horsepower-hour for the applicable engine family during the FTP cycle divided by 6.3 miles (or Vehicle-FTP cycle for optionally certified Otto-cycle hybrid powertrain family divided by 6.9 miles),

AUL = applicable useful life for the engine family or optionally certified Otto-cycle hybrid powertrain family in miles as defined in Section I.2.A of these test procedures. For example, the AUL for a 2027 model year heavy-duty Otto-cycle engine family certified to 2031 model year requirements is 200,000 miles.

MYUL = current model year useful life requirement for the engine family or optionally certified Otto-cycle hybrid powertrain family in miles as defined in Section I.2.A of these test procedures. For example, the MYUL for a 2027 model year heavy-duty Otto-cycle engine family certified to 2031 model year requirements is 155,000 miles,

Sales = California sales volume for the engine family or optionally certified Otto-cycle hybrid powertrain family during the model year. Projected model year sales are used for initial certification estimates. Actual sales numbers are used for end-of-year compliance determination.

(g) Credit life. CA-ABT credits may be used only for five model years after the year in which they are generated. For example, credits generated in model year 2024 may be used to demonstrate compliance with emission standards only through model year 2029.

(h) Family Emission Limits (FELs). The CA-ABT program for medium-duty and heavy-duty Otto-cycle engines and optionally certified Otto-cycle hybrid powertrain families has the following FEL caps depending on the model year:

(1) For 2023 and previous model years, the maximum NO_x and NMHC FEL values are identified in Section I.10 of these test procedures.

(2) For 2024 through 2026 model years, the maximum NO_x FEL value is 0.100 g/bhp-hr.

(3) For 2027 and subsequent model years, the maximum NO_x FEL value is 0.050 g/bhp-hr.

(4) For 2024 and subsequent model years, the maximum NMHC FEL value is 0.30 g/bhp-hr.

(i) Heavy-duty zero-emission averaging set. Zero-emission powertrain families with models used in class 4 through 8 vehicles are eligible to generate NO_x and NMHC credits in the heavy-duty zero-emission averaging set under the CA-ABT program. Zero-emission powertrain models used in class 3 or lower class vehicles are not eligible for participation in the CA-ABT program.

(1) Credit Life. Zero-emission NO_x and NMHC credits can be banked for use in future model years, only up through model year 2026. For example, credits generated in model year 2024 may be used to demonstrate compliance with emission standards only through model year 2026.

(2) Zero-emission NO_x and NMHC credits for each applicable zero-emission powertrain model within a powertrain family shall be calculated using the following equation:

$$\text{Zero emission Credits} = \text{Std} \times \text{ECF} \times \text{UL} \times \text{Sales} \times 10^{-6}$$

where:

Zero-emission credits are calculated for each zero-emission powertrain model within the powertrain family in Mg,

Std = the applicable FTP cycle NO_x or NMHC emission standard in grams per brake horsepower hour for the corresponding model year as specified in Section I.10 of these test procedures,

ECF = the transient cycle conversion factor (in bhp-hr/mile) is the total (integrated) cycle brake horsepower-hour for the applicable zero-emission powertrain model during the Vehicle-FTP cycle divided by 6.9 miles,

UL = applicable useful life for the vehicle family in which the powertrain model would be installed. UL is in miles as defined in 40 CFR §1037.105 last amended on October 25, 2016, and 40 CFR §1037.106 last amended on March 10, 2021 (Pre-publication), which is incorporated by reference herein.

Sales = California sales volume for the zero-emission powertrain model sold within the given powertrain family during the model year. Projected model year sales are used for initial certification. Actual sales numbers are used for end-of-year compliance determination.

(3) The heavy-duty zero-emission averaging set provisions and credits are only available for 2022 through 2026 model years. Any banked zero-emission credits would no longer be available in the CA-ABT program for 2027 and subsequent model years.

(4) In order to participate in the CA-ABT program, the heavy-duty zero-emission powertrain must meet to the following requirements:

(A) For 2022 through 2023 model years, the heavy-duty zero-emission powertrain family must be used in a heavy-duty zero-emission vehicle certified under title 17, CCR, section 95663.

(B) For 2024 through 2026 model years, the heavy-duty zero-emission powertrain family must be certified under title 13, CCR, section 1956.8(a)(8).

(j) CA-ABT reporting – A manufacturer must submit end-of-year reports for each engine family, optionally certified Otto-cycle hybrid powertrain family, and zero-emission powertrain family participating in the CA-ABT program, as described in subparagraphs B.2.(a) through B.2.(i) of this section.

(1) The end-of-year reports shall be submitted within 180 days of the end of the model year to: Chief, Emissions Certification and Compliance Division, California Air Resources Board, 4001 Iowa Ave., Riverside, CA 92507.

(2) These reports shall indicate the engine family name or optionally certified Otto-cycle hybrid powertrain family name or zero-emission powertrain family name and model names, the averaging set, the California sales volume, all of the parameters and corresponding values required to calculate credits as given in the applicable CA-ABT section, the resulting type and number of credits generated/required. Manufacturers shall also submit how and where credit surpluses were dispersed (or are to be banked) and how and through what means credit deficits were met. Copies of contracts related to credit trading must also be included or supplied by the broker if applicable. The report shall also include a calculation of credit balances to show that net mass emissions balances are within those allowed by the emission standards (equal to or greater than a zero credit balance).

(3) Errors discovered by ARB or the manufacturer in the end-of-year report, including changes in the production counts, may be corrected up to 90 days subsequent to submission of the end-of-year report. Errors discovered by ARB after 90 days shall be corrected if credits are reduced. Errors in the manufacturer's favor will not be corrected if discovered after the 90 day correction period allowed.

(4) Failure by a manufacturer participating in the CA-ABT programs to submit the end-of-year report (as applicable) in the specified time for all zero-emission powertrains, engines or optionally certified Otto-cycle hybrid powertrains that are part of an averaging set shall constitute a violation of title 13, CCR, section 1956.8 for each such powertrain and engine.

3. Early compliance credit multipliers for 2022 through 2030 model year engine families and optionally certified Otto-cycle hybrid powertrains - Manufacturers that produce and certify engines and optionally certified Otto-cycle hybrid powertrains that comply with future model year requirements in title 13, CCR, Sections 1956.8, 1968.2, 1971.1, 2035, 2036, 2112 and 2139 on a voluntary basis will be eligible for early compliance credit multipliers subject to the following limitations:

(a) Early compliance credit multipliers will only be available for 2022 through 2030 model year California certified engine families and optionally certified Otto-cycle hybrid powertrains.

(b) Early compliance eligibility criteria for engine families and optionally certified Otto-cycle hybrid powertrains – An eligible engine family or optionally certified Otto-cycle hybrid powertrain must meet all the applicable numeric emissions standards and requirements of the regulations as set forth in title 13, CCR, sections 1956.8, 1968.2, 1971.1, 2035, 2036, 2112 and 2139 for the specified model years, as specified in subparagraphs B.3.(d) and B.3.(e) below. For example, to get a 1.5 multiplier, an eligible 2025 model year engine family must certify to a NOx FEL of 0.020 g/bhp-hr or lower, and demonstrate compliance with the 2027 model year useful life, durability, warranty, in-use testing requirements, on-board diagnostics (OBD) requirements, etc. in order to participate in the program.

(c) Credits for engine families and optionally certified Otto-cycle hybrid powertrains that are eligible for early compliance credit multipliers shall be calculated, adjusted, and banked as follows:

$$\text{adjusted credits} = \text{emission credits} \times \text{ECCM}$$

where:

adjusted credits = Amount of credits that can be banked in the CA-ABT program (in Mg).

emission credits = Amount of credits calculated for each eligible engine family or optionally certified Otto-cycle hybrid powertrain as shown in subparagraph B.2.(f) of this section (in Mg).

ECCM = Early compliance credit multiplier as described in subparagraph B.3.(d) of this section.

(d) Early compliance credit multipliers shall be determined as shown below:

Engine (optionally certified Otto-cycle hybrid powertrain) Family Model Year	Complying with the Regulations for Model Years*	Early Compliance Credit Multiplier
2022 – 2023	2024 – 2026	1.5
2022 – 2023	2027 - 2030	2.0
2022 – 2023	2031 and subsequent	2.5
2024 – 2026	2027 - 2030	1.5
2024 – 2026	2031 and subsequent	2.0
2027 – 2030	2031 and subsequent	1.5

* Compliance with model year regulations means compliance with the requirements of title 13, CCR, sections 1956.8, 1968.2, 1971.1, 2035, 2036, 2112 and 2139 for the specified model years.

(e) Credits generated from zero-emission powertrain families are not eligible for early compliance credit multipliers.

16. Prohibition of defeat devices. **§86.004-16.** July 13, 2005. [No change.]
17. Emission control diagnostic system for light-duty vehicles and trucks. [§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.

18. [Reserved.]
19. [Reserved.]
20. Incomplete vehicles, classification. §86.085-20. January 12, 1983. [No change.]
21. Application for certification. [§86.xxx-21]
- A. Federal provisions.**
1. §86.004-21. April 28, 2014. [No change.]
 2. §86.007-21. April 28, 2014. [No change - diesel only.]
- B. California provisions.**
1. For California vehicles not certified exclusively on gasoline or diesel fuel, the manufacturer shall submit projected California sales and fuel economy data nineteen months prior to January 1 of the model year for which the engines are certified.
22. Approval of application for certification; test fleet selections; determinations of parameters subject to adjustment for certifications and Selective Enforcement Audit, adequacy of limits, and physically adjustable ranges. [§86.094-22] April 30, 2010. [No change.]
23. Required data. [§86.xxx-23]
- A. Federal provisions.**
1. §86.001-23. April 28, 2014. [No change.]
 2. §86.007-23. April 28, 2014. [No change.]
- B. California provisions.**
1. The data derived from testing to determine the exhaust emission deterioration factors shall be submitted to the Executive Officer for review. If the durability test method is accepted by EPA, it shall also be accepted by ARB, subject to the following condition. If, after certification for the first model year in which the method is used, the Executive Officer determines that a manufacturer's durability test procedures do not conform with good engineering practices, the Executive Officer may require changes to that manufacturer's durability test procedures for subsequent model years. The manufacturer's revised durability test procedures shall be submitted to the Executive Officer for review and approval.
 2. In lieu of testing for formaldehyde emissions for certification, a manufacturer may provide a statement in its application for certification that such vehicles comply with the applicable standards. Such a statement must be based on previous emission tests, development tests, or other appropriate information.
24. Test vehicles and engines. [§86.001-24] October 22, 1996. [No change.]
25. Maintenance. [§86.xxx-25]
- A. Federal provisions.**

1. §86.004-25. October 25, 2016. [No change.]
 - 1.1 Amend Subparagraph (a)(1) as follows:

Applicability. This section applies to light-duty vehicles, light-duty trucks, optionally certified Otto-cycle hybrid powertrains, and HDEs.
 - 1.2 Subparagraphs (a)(2) through (b)(3)(ii). [No change.]
 - 1.3 Add the following title (plus spacing) to the beginning of subparagraph (b)(3)(iii):

(3)(iii) Minimum Maintenance Intervals for Otto-Cycle Heavy-Duty Engines:
 - 1.4 Delete and replace the remainder of subparagraph (b)(3)(iii) as follows:

(iii) For 2022 through 2026 model year Otto-cycle hybrid powertrain families optionally certified for use in hybrid vehicles pursuant to title 13, CCR, section 1956.8, and for 2026 and earlier model-year Otto-cycle heavy-duty engines and 2027 and subsequent model year Otto-cycle engines used in vehicles with a GVWR less than or equal to 14,000 pounds, the adjustment, cleaning, repair, or replacement of the items listed in paragraphs (b)(3)(iii) (A)-(E) of this section shall initially not occur before 50,000 miles (or 1,500 hours) of use and thereafter not more frequently than at intervals of 50,000-miles (or 1,500-hours).

For 2027 and subsequent model year Otto-cycle hybrid powertrain families optionally certified for use in hybrid vehicles pursuant to title 13, CCR, section 1956.8, and for 2027 and subsequent model-year Otto-cycle heavy-duty engine families certified for use in vehicles with a GVWR greater than 14,000 pounds on gasoline or alternative fuels, including engine families that are certified for use in hybrid vehicles:

- *Adjustment or cleaning frequency.* The frequency of manufacturer scheduled adjustment or cleaning for the items listed in paragraphs (b)(3)(iii) (A)-(E) shall be limited by the same minimum maintenance intervals as for 2026 or earlier model-year Otto-cycle heavy-duty engines as stated in this paragraph (b)(3)(iii).
- *Repair or replacement frequency.* The frequency of manufacturer scheduled repair or replacement for the emission-related components and systems listed in paragraph (b)(3)(vi) shall be limited by the minimum maintenance intervals stated therein. These maintenance intervals do not apply to parts identified in 1037.120 for heavy-duty vehicles certified to the GHG emission standards of section 95663, title 17, CCR. The maintenance provisions for the GHG-related parts in 1037.120 for heavy-duty vehicles certified to the GHG emission standards of section 95663, title 17, CCR, are specified in 1037.125 of that same section.

- (A) Crankcase ventilation valves and filters.
- (B) Emission-related hoses and tubes.
- (C) Ignition wires.
- (D) Idle mixture.
- (E) Exhaust gas recirculation system related filters and coolers.

1.5 Amend subparagraph (b)(3)(iv) as follows:

(iv) (A) For 2022 through 2026 model year Otto-cycle hybrid powertrain families optionally certified for use in hybrid vehicles pursuant to title 13, CCR, section 1956.8, and for Otto-cycle light-duty vehicles, light-duty trucks, 2026 and earlier model-year Otto-cycle heavy-duty engines, and 2027 and subsequent model year Otto-cycle engines used in vehicles with a GVWR less than or equal to 14,000 pounds, the adjustment, cleaning, repair, or replacement of the oxygen sensor shall occur at 80,000 miles (or 2,400 hours) of use and at 80,000-mile (or 2,400-hour) intervals thereafter.

(B) For 2027 and subsequent model year Otto-cycle hybrid powertrain families optionally certified for use in hybrid vehicles pursuant to title 13, CCR, section 1956.8, and for 2027 and subsequent model-year Otto-cycle heavy-duty engines used in vehicles with a GVWR greater than 14,000 pounds, the frequency of manufacturer scheduled repair or replacement of the oxygen sensor shall be limited by the minimum maintenance interval for oxygen sensors specified in paragraph (b)(3)(vi).

1.6 Delete and replace subparagraph (b)(3)(v) as follows:

(v) For 2022 through 2026 model year Otto-cycle hybrid powertrain families optionally certified for use in hybrid vehicles pursuant to title 13, CCR, section 1956.8, and for 2026 and earlier model-year Otto-cycle heavy-duty engines and 2027 and subsequent model year Otto-cycle engines used in vehicles with a GVWR less than or equal to 14,000 pounds, the adjustment, cleaning, repair, or replacement of the items listed in paragraphs (b)(3)(v) (A)-(H) of this section shall initially not occur before 100,000 miles (or 3,000 hours) of use and thereafter not more frequently than at intervals of at least 100,000-miles (or 3,000-hours).

For 2027 and subsequent model year Otto-cycle hybrid powertrain families optionally certified for use in hybrid vehicles pursuant to title 13, CCR, section 1956.8, and for 2027 and subsequent model-year Otto-cycle heavy-duty engine families certified for use in vehicles with a GVWR greater than 14,000

pounds on gasoline or alternative fuels, including engine families that are certified for use in hybrid vehicles:

- *Adjustment or cleaning frequency.* The frequency of manufacturer scheduled adjustment or cleaning for the items listed in paragraphs (b)(3)(v) (A)-(H) shall be limited by the same minimum maintenance intervals as for 2026 or earlier model-year Otto-cycle heavy-duty engines as stated in this paragraph (b)(3)(v).
- *Repair or replacement frequency.* The frequency of manufacturer scheduled repair or replacement for the emission-related components and systems listed in paragraph (b)(3)(vi) shall be limited by the minimum maintenance intervals stated therein. These maintenance intervals do not apply to parts identified in 1037.120 for heavy-duty vehicles certified to the GHG emission standards of section 95663, title 17, CCR. The maintenance provisions for the GHG-related parts in 1037.120 for heavy-duty vehicles certified to the GHG emission standards of section 95663, title 17, CCR, are specified in 1037.125 of that same section.

(A) Catalytic converter.

(B) Air injection system components.

(C) Fuel injectors.

(D) Electronic engine control unit and its associated sensors (except oxygen sensor) and actuators.

(E) Evaporative emission canister.

(F) Turbochargers.

(G) Carburetors.

(H) Exhaust gas recirculation system (including all related control valves and tubing) except as otherwise provided in paragraph (b)(3)(iii)(E) of this section.

1.7 Add new subparagraph (b)(3)(vi) as follows:

(vi) For 2027 and subsequent model year Otto-cycle hybrid powertrain families optionally certified for use in hybrid vehicles pursuant to title 13, CCR, section 1956.8 (see §86.004-25 (b)(3)(vii) for guidance), and for 2027 and subsequent model year Otto-cycle heavy-duty engine families certified for use in vehicles with a GVWR greater than 14,000 pounds on gasoline or alternative fuels, including engine families that are certified for use in hybrid vehicles, repair and replacement for the emission-related components and systems listed below shall not occur before the first occurrence of a maintenance interval specified in the following table, and thereafter not more frequently than at least that same interval. Manufacturers may not schedule maintenance based on any other metric (e.g., hours of operation, calendar years, months, etc.) except as specifically provided in the

table below:

Component or System	Minimum Repair / Replacement Interval
	Heavy-Duty Otto-Cycle Engine GVWR > 14,000 lbs.
Exhaust Gas Recirculation (EGR) System (valves & cooler - not including hoses)	110,000 miles ¹
Exhaust Gas Recirculation (EGR) System (other than valves & cooler)	110,000 miles
Crankcase Ventilation System	50,000 miles, or 10 years
Fuel Injectors	110,000 miles
Turbochargers	110,000 miles ¹
Electronic Control Unit, Sensors, and Actuators (other than Oxygen Sensors)	100,000 miles
Oxygen Sensors	110,000 miles
Carburetor	110,000 miles
Evaporative Emissions Canister	110,000 miles
Air Injection System	110,000 miles ¹
Emission-Related Hoses and Tubes	110,000 miles
Ignition Wires	100,000 miles, or 4,000 hours
Catalytic Converter (bed only)	Not Replaceable ²
Catalytic Converter (other than catalyst bed)	110,000 miles
Any other add-on or new technology emission-related component or system whose primary purpose is to reduce	110,000 miles ³

1. Sensors and actuators are included only if they are integral to these assemblies and cannot be repaired without removing or replacing the assembly. Otherwise sensors and actuators are subject to the maintenance intervals specified in the table for Electronic Control Units, Sensors, and Actuators.
2. For components or systems designated in the table as "Not Replaceable," manufacturers shall not schedule any repair / replacement maintenance intervals throughout the applicable useful life of the heavy-duty Otto-cycle engine, defined in § 86.004-2 of the California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles, last amended [date of amendment], except as noted in (b)(7)(i) of this section § 86.004-25 (i).
3. Manufacturers may request more frequent repair / replacement maintenance intervals for add-on or new technology emission-related components provided that the manufacturer demonstrates to the Executive Officer's satisfaction that such intervals are technologically necessary and appropriate.

1.8 Subparagraphs (b)(4) through (b)(6)(ii)(F). [No change.]

1.9 Add the following phrase to the last sentence of subparagraph (b)(6)(iii): ... or California Vehicle Code §27156, et seq.

1.10 Subparagraph (b)(7)(i). [No change.]

1.11 Add the following paragraph to subparagraph (b)(7)(ii) as follows:

The Executive Officer may approve a request for new scheduled maintenance for:

(A) Beginning with the 2024 model year certification applications (with full carryover to model years 2025 and 2026);

(B) Beginning with the 2027 model year certification applications (with full carryover to model years 2028, 2029, and 2030);

(C) Beginning with the 2031 model year certification applications (with full carryover to model year 2032).

The Executive Officer shall base his or her approval on a determination, derived from good engineering judgment, that a manufacturer has submitted detailed evidence supporting the need for the maintenance requested, and supporting data or other substantiation for the recommended maintenance category and for the interval suggested for emission-related maintenance. This provision does not apply to the components or systems designated as “Not Replaceable”, as specified in § 86.004-25 (b)(4)(vi) of the “California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles”, as last amended September 9, 2021.

1.12 Add the following sentence to subparagraph (b)(7)(iii): The Executive Officer may also provide the manufacturer a hearing in accordance with title 17, CCR, §60055.1, et seq., with respect to such issue.

1.13 Subparagraphs (c) through (h). [No change.]

1.14 Delete and replace paragraph (i) as follows:

(i) Notwithstanding the provisions of paragraphs (b)(3) and (6) of this section, manufacturers may schedule replacement or repair of catalytic converter beds (including oxidation catalyst beds) provided that the manufacturer demonstrates to the Executive Officer's satisfaction that the repair or replacement will be performed according to the schedule and the manufacturer pays for the repair or replacement.

26. Mileage and service accumulation; emission measurements. [§86.004-26] April 28, 2014.

27. Special test procedures. [§86.090-27]. April 11, 1989. [No change.]

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

A. Federal provisions.

1. §86.004-28. October 25, 2016. [No change.]

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 86.004-21(b)(5)(i)(A), 86.007-21(b)(5)(i)(A), 86.001-23(b)(1)(ii), and 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 86.001-24(c), shall be conducted on methanol.

2. For fuel-flexible vehicles and engines, the noted deterioration factors shall be determined from testing conducted with gasoline fuel. However, as an assurance that fuel-flexible vehicles and engines will comply with applicable exhaust emission standards throughout their useful lives when operated on methanol fuel, the manufacturer shall demonstrate that exhaust emissions tests conducted with methanol fuel at the beginning, middle, and end of the durability service accumulation schedule do not exceed the applicable exhaust emission standards. For certification to be granted, the vehicle or engine may not exceed applicable certification exhaust emission standards.

3. For dual-fuel or multi-fuel gaseous engines and vehicles, the noted deterioration factors shall be determined separately for operation on each type of fuel or combination of fuels that the engine is designed to use. For certification to be granted, the provisions of 86.004-28(c) must be met separately for emissions using each type and combination of fuels.

29. Testing by the Administrator. [§86.091-29]. April 28, 2014. [No change.]

30. Certification. [§86.xxx-30].

A. Federal Provisions

1. §86.004-30. April 28, 2014. [No change.]
2. §86.007-30. October 25, 2016. [No change.]

B. California Provisions

1. If a 2024 or subsequent model year engine family or test group does not comply with the in-use test requirements in title 13, CCR, sections 2111-2140, warranty reporting requirements in title 13, CCR, sections 2141-2149, or is equipped with an emission control component that exceeds the thresholds specified in title 13, CCR, section 2143, and the component was not redesigned, recalibrated, or manufactured in a different manner to address component features identified to result in exceedance of the thresholds in title 13, CCR, section 2143 for the model year for which an application is requested, a manufacturer cannot request a

carryover or carry across application based on data from that engine family or test group. If the emission control component has been identified as causing an engine family or test group to exceed the thresholds specified in title 13, CCR, section 2143 has not been redesigned, recalibrated, or manufactured in a different manner to address component features identified to result in exceedance of such thresholds for the model year for which the application is requested, a manufacturer may only use carryover or carry across data if the manufacturer extends the warranty coverage for that emission control component to the full useful life of the engine family or test group.

31. Separate certification. [**§86.079-31**]. September 8, 1977. [No change.]
32. Addition of a vehicle or engine after certification. [§86.079-32]. September 8, 1977. [No change.]
33. Changes to a vehicle or engine covered by certification. [§86.079-33]. September 8, 1977. [No change.]
34. Alternative procedure for notification of additions and changes. [§86.082-34]. November 2, 1982. [No change.]
35. Labeling. [§86.xxx-35]
 - A. **Federal provisions.**
 1. §86.095-35. October 25, 2016.
 - 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.
 - 1.2 Subparagraphs (a)(1) through (a)(3)(iii)(G). [No change.]
 - 1.3 Amend subparagraph (a)(3)(iii)(H) as follows: An unconditional statement of compliance with the appropriate model year California regulations; for example, “This engine conforms to California regulations applicable to XXXX model year new heavy-duty Otto-cycle engines.” It may also state that the engine conforms to any applicable federal or Canadian emission standards for new heavy-duty Otto-cycle engines.
 - 1.4 Subparagraphs (a)(3)(iii)(I) through (i). [No change.]
 - B. **California Provisions**
 1. For 2004 through 2007 model year engines certified to the optional standards in 40 CFR §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.”

3. For 2022 and subsequent model year heavy-duty Otto-cycle hybrid powertrains optionally certified pursuant to title 13, CCR, section 1956.8, the label shall contain the following statement: “This Otto-cycle hybrid powertrain family conforms to California regulations applicable to XXXX model year hybrid powertrains and is intended for use primarily in Class Y vehicles.”

- 36.** Submission of vehicle identification numbers. [§86.079-36] [n/a]
- 37.** Production vehicles and engines. [§86.085-37]. October 25, 2016. [No change.]
- 38.** Maintenance instructions. **[§86.xxx-38]**
1. §86.004-38. April 28, 2014.
 - 1.1 Subparagraphs (a) through (f). [No change.]
 - 1.2 Amend subparagraph (g)(1) as follows:
 - (g) Emission control diagnostic service information:
 - (1) Manufacturers shall furnish or cause to be furnished to any person engaged in the repairing or servicing of motor vehicles or motor vehicle engines, or the Administrator upon request, any and all information needed to make use of the on-board diagnostic system and such other information, including instructions for making emission-related diagnosis and repairs, including, but not limited to, service manuals, technical service bulletins, recall service information, data stream information, bi-directional control information, and training information, unless such information is protected by section 208(c) of the Act or California Government Code Section 6250, as a trade secret. No such information may be withheld under section 208(c) of the Act or California Government Code Section 6250, if that information is provided (directly or indirectly) by the manufacturer to franchised dealers or other persons engaged in the repair, diagnosing, or servicing of motor vehicles or motor vehicle engines.
 - 1.3 Subparagraphs (g)(2) through (i). [No change.]
 2. §86.010-38. April 28, 2014. [No change, except as noted above for §86.004-38 subparagraph (g)(1).]
- 39.** Submission of maintenance instructions. [§86.079-39] September 8, 1977. [No change.]
- 40.** Heavy-duty engine rebuilding practices. **[§86.xxx-40]**
1. §86.004-40. January 18, 2001.
 - 1.1 Add the following sentence to the introductory paragraph: Any deviation from the provisions contained in this section is also a prohibited act under the California Vehicle Code §§27156, et seq.

1.2 Subparagraphs (a) through (e). [No change.]

Part II. OTHER REQUIREMENTS; TEST PROCEDURES

Subpart N - Exhaust Test Procedures for Heavy-Duty Engines

- 86.1301 Scope; applicability. October 25, 2016.
- 86.1302-84 Definitions. November 16, 1983.
- 86.1303-84 Abbreviations. November 16, 1983.
- 86.1304 Section numbering; construction. July 13, 2005.
- 86.1305 Introduction; structure of subpart. August 8, 2014.
- 86.1333 Transient test cycle generation. April 28, 2014.
- 86.1370 In-Use Test Procedures: Moving Average Window.

A. Federal Provisions

1. Delete paragraphs (a) through (j).

B. California Provisions

1. Test Procedures for Moving Average Window (MAW) Method.

The MAW method described in this paragraph applies to the CARB Heavy Duty In-Use Compliance Testing for 2024 and subsequent model year engines.

A test with the MAW consists of one shift-day. To complete a shift-day's worth of testing, start sampling at the beginning of a shift and continue sampling for the whole shift, subject to the calibration requirements of PEMS. A shift-day is the period of a normal workday for an individual employee. A shift day must begin with a cold start, where the engine coolant is equal to or less than 86 deg. F (30 deg. C). The engine may be shut down and keyed on during the shift day, but the PEMS must remain active and recording throughout the shift-day.

1.1 Moving Average Window principle: Mass emissions for the pollutants *[NMHC, CO, NO_x, and PM]* shall be evaluated using a moving average window method, based on a reference time of 300 seconds. Mass emissions are not calculated for the complete test, but for subsets equal to 300 seconds in length, and referred to as "windows". Windows will overlap each other with a time increment, Δt , equal to the data sampling rate of 1 second. The start of windows begins every valid second of the data set.

1.2 Exclusions. Only valid data shall be considered in calculating window duration, work, CO₂ mass, and criteria emissions of the averaging window. If the window encounters invalid data, skip the invalid data, and include seconds of valid data to compensate at the end of the window to a total window of 300 seconds of valid data. For windows using the exclusions in 1.2.1 through 1.2.7, if the invalid data is continuous for a consecutive period greater than 600 seconds, the window ends and a new window would need to be generated once valid data is encountered again. In cases where invalid data is in excess of 600 seconds, a detailed explanation of the cause of invalid data conditions must be documented.

Data collected during any of the following conditions shall be considered invalid data:

1.2.1 Zero drift check or conditioning of the Portable Emissions Measurement System (PEMS) instrumentation

1.2.2 Atmospheric pressure less than 82.5 kPa

1.2.3 Ambient air temperature less than 19 deg. F (-7 deg. C)

1.2.4 Altitudes greater than 5,500 feet above sea-level; or

1.2.5 Altitudes less than or equal to 5,500 feet above sea level, for temperatures greater than the temperature determined by the following equation at the specified altitude

$$T_{invalid} > -0.00254 \times h + 100$$

Where:

$T_{invalid}$ is the ambient air temperature threshold where above this temperature the data is considered invalid at a specific altitude, in degrees Fahrenheit

h is the altitude above sea-level, in feet (h is negative for altitudes below sea-level)

1.2.6 For model years 2024 through 2026, engine coolant temperature is less than 158 deg. F (70 deg. C) and engine coolant temperature is not stabilized within ± 3.6 deg. F (± 2 deg. C) over a period of five minutes.

1.2.7 Operation where the engine is shut-off or keyed off where the engine rpm is equivalent to zero.

1.3 Valid tests.

Retesting must be conducted if a test is determined to be invalid. A valid test is determined by meeting all of the following conditions:

1.3.1 Test start: emissions sampling (NMHC, CO, NOx, PM and CO₂), exhaust flowrate parameters, and sampling of relevant OBD parameters, and ambient temperature and humidity shall commence prior to starting the engine. The coolant temperature shall not exceed 86 deg. F (30 deg. C) at the beginning of the test. If the ambient temperature and the coolant temperature exceeds 86 deg. F (30 deg. C) at the start of the test, the test is void and testing shall be rescheduled.

1.3.2 The test will be required to have a minimum of 2,400 valid windows. If 2,400 valid windows are not achieved during the shift day, continue testing for additional shift days necessary to achieve a minimum of 2,400 valid windows.

1.3.3 For 2024 through 2026 model year engines only, the average engine power over the test must be equal to or greater than 10% of the engine's peak power for a valid test. In the event of an invalid test, the manufacturer shall retest the vehicle additional days until a valid test is achieved.

1.4 Emissions testing evaluation and vehicle pass criteria

Sum-over-Sum (SOS) Evaluation:

To determine in-use compliance, the emissions for each criteria pollutant (NMHC, CO, NOx, and PM) shall be calculated. The SOS emissions are calculated for each pollutant using the equation:

$$e_{sos\ a} = \frac{\sum_{k=1}^{n_b} \sum_{t=1}^{300} (\dot{m}_a \times \Delta t)}{\sum_{k=1}^{n_b} \sum_{t=1}^{300} (\dot{m}_{CO_2} \times \Delta t)} \times FCL$$

Where:

$e_{sos\ a}$ is the SOS emissions [g/bhp-hr] of a pollutant in a bin, where

subscript "a" is the pollutant (NMHC, CO, NOx, and PM)

\dot{m}_a is the mass emission rate of criteria pollutant a [g/sec]

\dot{m}_{CO_2} is the mass emission rate of CO₂ [g/sec]

FCL is the family certification level on the FTP cycle [g CO₂/bhp-hr]

n_b is the total number of valid windows

Δt is equal to the data sampling rate [1 second]

The engine pass criteria is determined by comparing SOS criteria emission to the In-Use threshold, defined as the applicable FTP standard multiplied by the conformity factor (CF).

The engine passes the test if the SOS emissions are less than or equal to the defined threshold for every pollutant fulfilling the equation.

$$e_{sos\ a} \leq CF \times \text{FTP standard}$$

where:

CF is the conformity factor equal to 2.0 for 2024 through 2029 model year engines. For 2030 and subsequent model year engines, the conformity factor is equal to 1.5.

FTP standard can be found in title 13, CCR, § 1956.8

The engine fails the test if any pollutant's SOS emissions exceeds the in-use threshold.

1.5 Fuel Enrichment Exclusion for 2024 through 2026 MY Engines

If the in-use test fails and fuel enrichment occurred during the test, the following procedure may be used for fuel enrichment operation observed during the test when calculating the SOS emissions in Section 1.4. A percentage based on fuel enrichment operation will be used to determine the percentage of data to be excluded from the SOS calculation.

1.5.1 The following procedure shall be used to determine the amount of fuel enrichment data to be excluded due to activation of AECDs approved during certification:

a. Up to 5% of total test time for all pollutants may be excluded from the compliance calculation equal to the cumulative enrichment test time as reported by any of the J1979 fuel enrichment EI-AECD tracking data streams.

b. The data shall be considered in a fuel enrichment condition if indicated by an increment of any of the J1979 fuel enrichment EI-AECD trackers. Determine the fraction of fuel enrichment operation by calculating the time difference between the beginning and ending trackers and dividing by the total engine run time during the test.

c. If the test has less than 5% fuel enrichment operation, the percent of data to be invalidated is equal to the percent of fuel enrichment during the test. If the test has greater than or equal to 5% of fuel enrichment operation, the percent of data able to be invalidated is equal to 5%.

1.5.2 Identify the raw data (i.e., 1 Hz data) with enrichment operation. Order all of the criteria pollutant data from lowest to greatest CO emissions rate. Exclude the percent of identified criteria pollutant data allowed based on the highest CO emissions rate ranking per Section 1.5.1 (c). With the remaining non-excluded 1 Hz data, recalculate the window emissions for each pollutant for the test.

1.5.3 The SOS may be recalculated using the new windows calculated in 1.5.2. to determine if the engine passes or fails in-use testing according to section 1.4.

Subpart P - Emission Regulations for New Gasoline-Fueled and Methanol-Fueled Otto-Cycle Heavy-Duty Engines and New Gasoline-Fueled and Methanol-Fueled Otto-Cycle Light-Duty Trucks; Idle Test Procedures.

- 86.1501 Scope; applicability. June 30, 2008.
- 86.1502 Definitions. June 30, 2008.
- 86.1503 Abbreviations. June 30, 2008.
- 86.1505 Introduction; structure of subpart. June 30, 2008.

- 86.1506 Equipment required and specifications; overview. June 30, 2008.
- 86.1509 Exhaust gas sampling system. June 30, 2008.
- 86.1511 Exhaust gas analysis system. June 30, 2008.
- 86.1513 Fuel specifications. June 30, 2008.
- 86.1514 Analytical gases. June 30, 2008.
- 86.1516 Calibration; frequency and overview. June 30, 2008.
- 86.1519 CVS calibration. June 30, 2008.
- 86.1522 Carbon monoxide analyzer calibration. June 30, 2008.
- 86.1524 Carbon dioxide analyzer calibration. June 30, 2008.
- 86.1526 Calibration of other equipment. June 30, 2008.
- 86.1527 Idle test procedure; overview. June 30, 2008.
- 86.1530 Test sequence; general requirements. June 30, 2008.
- 86.1537 Idle test run. June 30, 2008.
- 86.1540 Idle exhaust sample analysis. June 30, 2008.
- 86.1542 Information required. June 30, 2008.
- 86.1544 Calculation; idle exhaust emissions. June 30, 2008.

Appendix I to Part 86 - Urban Dynamometer Schedules.

(f)(1) EPA Engine Dynamometer Schedule for Heavy-Duty Gasoline-Fueled Engines. April 29, 1998.

Appendix XII to Part 86 - Tables for Production Compliance Auditing of Heavy-Duty Engines and Heavy-Duty Vehicles, Including Light-Duty Trucks. August 30, 1985. [n/a as applies to light-duty trucks]

PART 1036 – CONTROL OF EMISSIONS FROM NEW AND IN-USE HEAVY-DUTY HIGHWAY ENGINES

Subpart A – Overview and Applicability

1036.1 Does this part apply for my engines? March 10, 2021 (Pre-publication).

1. Amend subparagraph (a) as follows: Except as specified in 40 CFR § 1036.5, the provisions of this part apply for engines that will be installed in heavy-duty vehicles (including glider vehicles) above 14,000 pounds GVWR for propulsion, 2022 and subsequent model year Otto-cycle hybrid powertrains optionally certifying to criteria pollutants emission standards pursuant to title 13, CCR, section 1956.8 that will be installed in incomplete vehicles from 10,001 to 14,000 pounds GVWR, and 2022 and subsequent model year Otto-cycle hybrid powertrains optionally certifying to criteria pollutants emission standards pursuant to title 13, CCR, section 1956.8 that will be installed in heavy-duty vehicles above 14,000 pounds GVWR. These provisions also apply for engines that will be installed in 2019 and earlier model year incomplete heavy-duty vehicles from 8,501 to 10,000 pounds GVWR and in incomplete heavy-duty vehicles from 10,001 to 14,000 pounds GVWR, unless the engine is installed in a vehicle that is covered by an Executive Order under 40 CFR part 86, subpart S.

2. Amend subparagraph (b) as follows: This part does not apply with respect to exhaust emission standards for HC, CO, NO_x, or PM except as follows:

(1) The provisions of section 1036.601 of these test procedures apply.

(2) 40 CFR parts 85 and 86 may specify that certain provisions apply.

(3) The provisions of section 1036.501(h)(1) of these test procedures apply.

(4) Otto-cycle hybrid powertrain optionally certifying to criteria pollutants emission standards pursuant to title 13, CCR, 1956.8 apply.

3. Delete subparagraph (c).

4. Subparagraph (d). [No change.]

1036.2 Who is responsible for compliance? October 25, 2016.

1036.5 Which engines are excluded from this part's requirements? October 25, 2016.

1. Subparagraph (a). No change.

2. Amend subparagraph (b) as follows: Engines installed in heavy-duty vehicles that do not provide motive power are nonroad engines, except for Otto-cycle engines installed in an Otto-cycle hybrid powertrain optionally certifying to criteria pollutants emission standards pursuant to title 13, CCR 1956.8 regardless whether the engine provides motive power or not. The provisions of this part therefore do not apply to these engines. See 40 CFR parts 1039, 1048, or 1054 for other requirements that apply for these auxiliary engines. See 40 CFR part 1037 for requirements that may apply for vehicles using these engines, such as the evaporative emission requirements of 40 CFR 1037.103.

3. Subparagraphs (c) through (e). [No change.]
- 1036.10 How is this part organized? October 25, 2016.
- 1036.15 Do any other regulation parts apply to me? October 25, 2016.
- 1036.30 Submission of information. October 25, 2016.
1. Amend subparagraph as follows: Send all reports and requests for approval to the ARB Designated Compliance Officer, as follows: Chief, Emissions Certification and Compliance Division, California Air Resources Board, 4001 Iowa Ave., Riverside, CA 92507.

Subpart B – Emission Standards and Related Requirements

- 1036.100 Overview of exhaust emission standards. October 25, 2016.
- 1036.108 Greenhouse gas emission standards. October 25, 2016.
1. Add the following section to the introductory paragraph: Optional Compliance Via the 2014 MY National Heavy-Duty Engine and Vehicle Greenhouse Gas Program. For the 2014 through 2020 model years, a manufacturer may elect to demonstrate compliance with this 40 CFR section, §1036.108, for all of its applicable heavy-duty engines by demonstrating compliance with the 2014 MY National Heavy-Duty Engine and Vehicle Greenhouse Gas Program, if it meets the criteria identified below.
- (1) A manufacturer that selects compliance with this option must notify the Executive Officer of that selection, in writing, prior to the start of the applicable model year or December 1, 2014, whichever is later;
- (2) The manufacturer must submit to ARB all data that it submitted to U.S. Environmental Protection Agency in accordance with the reporting requirements as required under 40 CFR §1036.205, §1036.250, and §1036.730, for demonstrating compliance with the 2014 MY National Heavy-Duty Engine and Vehicle Greenhouse Gas Program and the U.S. Environmental Protection Agency determination of compliance. With the exception of the 2014 model year, all such data must be submitted within 30 days of receipt of the U.S. Environmental Protection Agency Certificate of Conformity or of the date of submission to the U.S. Environmental Protection Agency, whichever is later, for each model year that a manufacturer selects compliance with this option;
- (3) The manufacturer must provide to the Executive Officer separate numbers for each engine family of heavy-duty engines produced and delivered for sale in California each model year and all values used in calculating positive or negative emission credits in 40 CFR §1036.730.
2. Subparagraphs (a) through (a)(1). [No change.]
3. Add the following language to subparagraph (a)(1)(i): As an option, 2017 through 2027 model year heavy-duty Otto-cycle engines, except in all cases engines used in medium-duty vehicles, may be certified to the Optional Low-CO₂ Emission Standard. The CO₂ emissions from engines certified to the Optional Low-CO₂ Emission Standard may not exceed 490 g/hp-hr. Engines certified to the Optional Low-CO₂ Emission Standard must also comply with the applicable CH₄ and N₂O

emission standards set forth in subparagraphs (a)(2) and (a)(3), respectively. In addition, engines certified to the Optional Low-CO₂ Emission Standard and participating in the Innovative Technology Regulation set forth in §§2208 and 2208.1 of title 13, CCR are not eligible to participate in the averaging, banking, and trading program, or to generate credits for certification.

4. Subparagraphs (a)(1)(ii) through (f). [No change.]

1036.115 Other requirements. October 25, 2016.

1036.130 Installation instructions for vehicle manufacturers. October 25, 2016.

1. Subparagraphs (a) through (b)(1). [No change.]

2. Delete and replace subparagraph (b)(2), as follows: State “Failing to follow these instructions when installing a certified engine, or an optionally certified Otto-cycle hybrid powertrain, in a heavy-duty motor vehicle violates federal and state law, subject to fines or other penalties as described in the Clean Air Act and California Health and Safety Code.”

3. Subparagraphs (b)(3) through (d). [No change.]

1036.135 Labeling. October 25, 2016.

1. Amend the introductory paragraph as follows: Beginning January 1, 2015, label your engines, or optionally certified Otto-cycle hybrid powertrains, as described in 40 CFR §86.007-35(a)(3), as modified by these test procedures, with the following additional information:

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

1036.140 Primary intended service class and engine cycle. October 25, 2016.

1. Amend the introductory paragraph as follows: You must identify a single primary intended service class for each engine family, or for each optionally certified Otto-cycle hybrid powertrain family that best describes vehicles for which you design and market the engine, or the optionally certified Otto-cycle hybrid powertrain, as follows:

2. Subparagraphs (a) through (c). [No change.]

1036.150 Interim provisions. October 25, 2016.

Subpart C – Certifying Engine Families

1036.205 What must I include in my application? October 25, 2016.

1. Amend the introductory paragraph as follows: This Subpart C also applies to optionally certifying Otto-cycle hybrid powertrain families. Submit an application for certification as described in 40 CFR 86.007–21, with the following additional information:

2. Amend subparagraph (a) as follows: Describe the engine family’s, or optionally certified Otto-cycle hybrid powertrain family’s, specifications and other basic parameters of the engine’s or optionally certified Otto-cycle hybrid

powertrain's, design and emission controls with respect to compliance with the requirements of this part. Describe in detail all system components for controlling greenhouse gas emissions, and criteria pollutants emissions for Otto-cycle hybrid powertrains optionally certified pursuant to title 13, CCR, 1956.8, including all auxiliary emission control devices (AECDs) and all fuel system components you will install on any production or test engine, or optionally certified Otto-cycle hybrid powertrain. Identify the part number of each component you describe. For this paragraph (a), treat as separate AECDs any devices that modulate or activate differently from each other.

3. Subparagraph (b). [No change.]

4. Amend subparagraph (c) as follows: Include the emission-related installation instructions you will provide if someone else installs your engines, or optionally certified hybrid powertrains, in their vehicles (see §1036.130).

5. Subparagraphs (d) through (e). [No change.]

6. Amend subparagraph (f) as follows: Identify the engine family's, or powertrain family's, deterioration factors and describe how you developed them (see §1036.241). Present any test data you used for this.

7. Amend subparagraph (g)(1) as follows: Present exhaust emission data for CO₂, CH₄, and N₂O on an emission-data engine to show that your engines meet the applicable emission standards we specify in §1036.108, or, for optionally certified Otto-cycle hybrid powertrains, present exhaust emission data for criteria pollutants on an emission-data Otto-cycle hybrid powertrain to show that your optionally certified Otto-cycle hybrid powertrains meet the applicable emission standards pursuant to title 13, CCR, Section 1956.8. Show emission figures before and after applying deterioration factors for each engine. In addition to the composite results, show individual measurements for cold-start testing and hot-start testing over the transient test cycle. For each of these tests, also include the corresponding exhaust emission data for criteria emissions. Note that §1036.235 allows you to submit an application in certain cases without new emission data.

8. Amend subparagraph (h) as follows: State whether your certification is limited for certain engines, or optionally certified Otto-cycle hybrid powertrains. For example, if you certify heavy heavy-duty engines to the CO₂ standards using only transient testing, the engines may be installed only in vocational vehicles.

9. Amend subparagraph (i) as follows: Unconditionally certify that all the engines in the engine family, or all the Otto-cycle hybrid powertrains in the optionally certified Otto-cycle hybrid powertrain family, are built as described and comply with the requirements of this part, other referenced parts of the CFR, and title 13, CCR, section 1956.8. Note that 40 CFR §1036.235 specifies which engines to test to show that engines in the entire family comply with the requirements of this part.

10. Subparagraphs (j) through (n). [No change.]

1036.210 Preliminary approval before certification. October 25, 2016.

1. Amend the introductory paragraph as follows: If you send us information before you finish the application, we may review it and make any appropriate

determinations, especially for questions related to engine family definitions, or optionally certified Otto-cycle hybrid powertrain family definitions, auxiliary emission control devices, adjustable parameters, deterioration factors, testing for service accumulation, and maintenance. Decisions made under this section are considered to be preliminary approval, subject to final review and approval. We will generally not reverse a decision where we have given you preliminary approval, unless we find new information supporting a different decision. If you request preliminary approval related to the upcoming model year or the model year after that, we will make best-efforts to make the appropriate determinations as soon as practicable. We will generally not provide preliminary approval related to a future model year more than two years ahead of time.

1036.225 Amending my application for certification. March 10, 2021 (Pre-publication).

1. Amend the introductory paragraph as follows: Before we issue you a certificate of conformity, you may amend your application to include new or modified engine configurations, subject to the provisions of this section. After we have issued your certificate of conformity, but before the end of the model year, you may send us an amended application requesting that we include new or modified engine configurations within the scope of the certificate, subject to the provisions of this section. You must amend your application if any changes occur with respect to any information that is included or should be included in your application. The requirements of this section also apply to optionally certified Otto-cycle hybrid powertrains, as appropriate, understanding “engine” to mean “optionally certified Otto-cycle hybrid powertrain” and “engine family” to mean “optionally certified Otto-cycle hybrid powertrain family”.

2. Subparagraphs (a) through (g). [No change.]

1036.230 Selecting engine families. March 10, 2021 (Pre-publication).

1. Amend the introductory paragraph as follows: See 40 CFR 86.001–24 for instructions on how to divide your product line into families of engines that are expected to have similar emission characteristics throughout the useful life, or see 40 CFR 1037.231 for instructions on how to divide your product line into families of optionally certified Otto-cycle hybrid powertrains that are expected to have similar emission characteristics throughout the useful life. You must certify your engines to the standards of §1036.108 using the same engine families you use for criteria pollutants under 40 CFR part 86. The requirements of this section also apply to optionally certified Otto-cycle hybrid powertrains, as appropriate, understanding “engine” to mean “optionally certified hybrid powertrain” and “engine family” to mean “optionally certified hybrid powertrain family”. The following provisions also apply:

2. Subparagraphs (a) through (f). [No change.]

1036.235 Testing requirements for certification. May 12, 2020.

1. Amend the introductory paragraph as follows: This section describes the

emission testing you must perform to show compliance with the greenhouse gas emission standards in §1036.108. This section also describes the emission testing you must perform for Otto-cycle hybrid powertrain optionally certifying to the criteria pollutants emission standards pursuant to title 13, CCR 1956.8, understanding “engine” to mean “optionally certified Otto-cycle hybrid powertrain” and “engine family” to mean “optionally certified Otto-cycle hybrid powertrain family”, and comply with the requirements of this part, other referenced parts of the CFR, and title 13, CCR, section 1956.8.

2. Subparagraphs (a) through (f). [No change.]

1036.241 Demonstrating compliance with greenhouse gas emission standards. October 25, 2016.

1036.250 Reporting and recordkeeping for certification. October 25, 2016.

1036.255 What decisions may ARB make regarding my certificate of conformity? March 10, 2021 (Pre-publication).

Subpart D – Testing Production Engines and Hybrid Powertrains

1036.301 Measurements related to GEM inputs in a selective enforcement audit. March 10, 2021 (Pre-publication).

Subpart E – In-use Testing

1036.401 In-use testing. October 25, 2016.

1. Amend this paragraph as follows: We may perform in-use testing of any engine family subject to the standards of this part, consistent with the provisions of §1036.235, or any optionally certified Otto-cycle hybrid powertrain family subject to the standards of this part, other referenced parts of the CFR, and title 13, CCR, section 1956.8, consistent with the provisions of section 1036.235 of these test procedures.

Subpart F – Test Procedures

1036.501 How do I run a valid emission test? March 10, 2021 (Pre-publication).

1. Amend subparagraph (a) as follows: Use the equipment and procedures specified in this subpart and 40 CFR 86.1305 to determine whether engines meet the emission standards in § 1036.108, or for optionally certified Otto-cycle hybrid powertrains, the emission standards in title 13, CCR, §1956.8.

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

3. Amend subparagraph (h) as follows: The following additional provisions apply for testing to demonstrate compliance with the emission standards in § 1036.108 for model year 2021 and later engines, or title 13 CCR § 1956.8 for model year 2022 and later optionally certified Otto-cycle hybrid powertrains.

4. Subparagraphs (h)(1) through (h)(2). [No change.]

5. Amend subparagraph (h)(3) as follows: Measure CO₂, CH₄, and N₂O emissions, or for diesel hybrid powertrains optionally certifying pursuant to title 13, CCR, § 1956.8, measure criteria pollutants emissions, over the transient cycle specified in either section 86.1333 or § 1036.510 or appendix II to part 1036 of these test procedures.

6. Subparagraph (h)(4). [No change.]

7. Add new subparagraph (h)(5) as follows: For Otto-cycle hybrid powertrains optionally certifying pursuant to title 13, CCR, § 1956.8, measure or calculate emissions of criteria pollutants to demonstrate compliance with the standards of this part, other referenced parts of the CFR, including 40 CFR part 86, subpart A, and title 13, CCR, § 1956.8.

1036.503 Engine data and information for vehicle certification. March 10, 2021 (Pre-publication).

1. Amend the introductory paragraph as follows: You must give vehicle manufacturers information as follows so they can certify model year 2021 and later vehicles, or for 2022 and subsequent model year optionally certified Otto-cycle hybrid powertrains understanding “engine” to mean “optionally certified Otto-cycle hybrid powertrain” and “engine family” to mean “optionally certified Otto-cycle hybrid powertrain family”, as applicable.

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

1036.505 Ramped-modal testing procedures. October 25, 2016.

1036.510 Transient Testing procedures. March 10, 2021 (Pre-publication).

1036.525 Hybrid engines. March 10, 2021 (Pre-publication).

1036.527 Powertrain system rated power determination. March 10, 2021 (Pre-publication).

1036.530 Calculating greenhouse gas emission rates. March 10, 2021 (Pre-publication).

1036.535 Determining steady-state engine fuel maps and fuel consumption at idle. March 10, 2021 (Pre-publication).

1036.540 Determining cycle-average engine fuel maps. March 10, 2021 (Pre-publication).

1036.543 Carbon balance error verification. March 10, 2021 (Pre-publication).

Subpart G – Special Compliance Provisions

- 1036.601 What compliance provisions apply? October 25, 2016.
1. Subparagraphs (a) through (a)(2). [No change.]
 2. Amend subparagraph (a)(3) as follows: The warranty-related prohibitions in title 13, CCR, sections 2035, 2036, 2037, 2039, 2040, 2041, and 2042, apply to manufacturers of new heavy-duty highway engines, and optionally certified Otto-cycle hybrid powertrains, in addition to the prohibitions described in 40 CFR 1068.101(b)(6).
 3. Subparagraphs (a)(4) through (d). [No change.]
- 1036.605 GHG exemption for engines used in specialty vehicles. October 25, 2016.
- 1036.610 Off-cycle technology credits and adjustments for reducing greenhouse gas emissions. October 25, 2016.
1. Subparagraphs (a) through (c). [No change.]
 2. Amend subparagraph (d) as follows: We may seek public comment on your request. However, we will generally not seek public comment on credits/adjustments based on A to B engine dynamometer testing, chassis testing, or in-use testing.
 3. Subparagraph (e). [No change.]
- 1036.615 Engines with Rankine cycle waste heat recovery and hybrid powertrains. October 25, 2016.
- 1036.620 Alternate CO₂ standards based on model year 2011 compression-ignition engines. [n/a; diesel]
- 1036.625 In-use compliance with family emission limits (FELs). October 25, 2016.
- 1036.630 Certification of engine GHG emissions for powertrain testing. October 25, 2016.

Subpart H – Averaging, Banking, and Trading for Certification

- 1036.701 General provisions. October 25, 2016.
1. Add the following language to subparagraph (a): Engines certified to the Optional Low-CO₂ Emission Standards pursuant to 40 CFR §1036.108, as amended September 15, 2011, which is hereby incorporated herein, as modified by these test procedures, and participating in the Innovative Technology Regulation set forth in §§2208 and 2208.1 of title 13, CCR may not generate credits or participate in the averaging, banking, and trading provisions of this subpart.
 2. Subparagraphs (b) through (j). [No change.]
- 1036.705 Generating and calculating emission credits. March 10, 2021 (Pre-publication).
- 1036.710 Averaging. October 25, 2016.

- 1036.715 Banking. October 25, 2016.
- 1036.720 Trading. October 25, 2016.
- 1036.725 What must I include in my application for certification? October 25, 2016.
- 1036.730 ABT reports. October 25, 2016.
- 1036.735 Recordkeeping. October 25, 2016.
- 1036.740 Restrictions for using emission credits. October 25, 2016.
- 1036.745 End-of-year CO₂ credit deficits. October 25, 2016.
- 1036.750 What can happen if I do not comply with the provisions of this subpart? October 25, 2016.
- 1036.755 Information provided to the Department of Transportation. [n/a]

Subpart I – Definitions and Other Reference Information

- 1036.801 Definitions. March 10, 2021 (Pre-publication).
- A. Federal Provisions.** [All federal definitions apply, except as otherwise noted below.]

B. California Provisions.

“2014 MY National Heavy-Duty Engine and Vehicle Greenhouse Gas Program” means the national program that applies to new 2014 through 2020 model medium- and heavy-duty engines and vehicles to control greenhouse gas emissions, as adopted by the U.S. Environmental Protection Agency (76 Fed. Reg. 57106 (September 15, 2011)), and as subsequently amended on June 17, 2013, as incorporated in and amended by these test procedures.

“Certificate of Conformity” means an Executive Order certifying engines, or optionally certified Otto-cycle hybrid powertrains, for sale in California.

“Certification” means relating to the process of obtaining an Executive Order for an engine family, or optionally certified Otto-cycle hybrid powertrain family, that complies with the emission standards and requirements in this part.

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

“Designated Enforcement Officer” means the Executive Officer of the Air Resources Board or a designee of the Executive Officer.

“EPA” shall also mean Air Resources Board or Executive Officer of the Air Resources Board.

“Hybrid powertrain” means a hybrid system that includes energy storage

features other than a conventional battery system or conventional flywheel, Otto-cycle engine, electric motor-generator system, battery management system, including thermal management systems and associated power electronics. Supplemental electrical batteries and hydraulic accumulators are examples of hybrid energy storage systems. Note other examples of systems that qualify as hybrid engines or powertrains are systems that recover kinetic energy and use it to power an electric heater in the aftertreatment. Note that certain provisions in this part treat hybrid engines and powertrains intended for vehicles that include regenerative braking different than those intended for vehicles that do not include regenerative braking.

“Hybrid vehicle” means a vehicle that includes energy storage features other than a conventional battery system or conventional flywheel in addition to an internal combustion engine or other engine using consumable chemical fuel, including a vehicle installed with an Otto-cycle hybrid powertrain optionally certified to the criteria pollutant emission standards pursuant to title 13, CCR 1956.8. Supplemental electrical batteries and hydraulic accumulators are examples of hybrid energy storage systems. Note other examples of systems that qualify as hybrid engines or powertrains are systems that recover kinetic energy and use it to power an electric heater in the aftertreatment. Note that certain provisions in this part treat hybrid vehicles that include regenerative braking different than those that do not include regenerative braking.

“Manufacturer” means any person who manufactures or assembles an engine, optionally certified Otto-cycle hybrid powertrain, vehicle, or piece of equipment for sale in California or otherwise introduces a new engine into commerce in California. This includes importers who import engines, optionally certified Otto-cycle hybrid powertrains, or vehicles for resale.

“U.S. Environmental Protection Agency” means the United States Environmental Protection Agency.

“We (us, our)” means the Executive Officer and any authorized representatives.

1036.805 Symbols, acronyms, and abbreviations. June 30, 2017.

A. Federal Provisions. [No change.]

B. California Provisions.

ARB means Air Resources Board.

1036.810 Incorporation by reference. March 10, 2021 (Pre-publication).

1036.815 Confidential information. October 25, 2016.

A. Federal Provisions. [No change.]

B. California Provisions. The provisions of title 17, CCR section 91000 through 91022 apply for information you consider confidential. Note that according to section 91011, emissions data shall not be identified as confidential.

1036.820 Requesting a hearing. October 25, 2016.

1. Delete subparagraph (a) and replace as follows: You may request a hearing under certain circumstances, as described elsewhere in this part.
2. Subparagraph (b). [No change.]
3. Amend subparagraph (c) as follows: If we agree to hold a hearing, we will use the procedures specified in 17 CCR sections 60055.1 through 60055.43.

1036.825 Reporting and recordkeeping requirements. October 25, 2016.

1. Subparagraphs (a) through (d). [No change.]
2. Delete subparagraph (e).

Appendix I to Part 1036 – Summary of Previous Emission Standards. March 10, 2021 (Pre-publication).

Appendix II to Part 1036 – Transient Duty Cycles. March 10, 2021 (Pre-publication).

Appendix III to Part 1036 – Default Engine Fuel Maps for 40 CFR §1036.540. March 10, 2021 (Pre-publication).

PART 1065 – ENGINE-TESTING PROCEDURES.

Subpart A – Applicability and General Provisions.

- 1065.1 Applicability. April 28, 2014.
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 (h). [No change.]
- 1065.2 Submitting information to ARB under this part. April 28, 2014.
1. Subparagraphs (a) through (d). [No change.]
 2. Amend subparagraph (e) as follows: See title 17, 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. October 25, 2016.
- 1065.12 Approval of alternate procedures. April 28, 2014.
- 1065.15 Overview of procedures for laboratory and field testing. October 25, 2016.
1. Subparagraphs (a) through (a)(2)(ii). [No change.]
 2. Delete subparagraph (a)(2)(iii).
 3. Subparagraphs (a)(2)(iv) through (f). [No change.]
- 1065.20 Units of measure and overview of calculations. April 28, 2014.
- 1065.25 Recordkeeping. April 28, 2014.

Subpart B – Equipment Specifications

- 1065.101 Overview. June 30, 2008.
- 1065.110 Work inputs and outputs, accessory work, and operator demand. June 30, 2008.
- 1065.120 Fuel properties and fuel temperature and pressure. June 30, 2008.
- 1065.122 Engine cooling and lubrication. June 30, 2008.
- 1065.125 Engine intake air. September 15, 2011.

- 1065.127 Exhaust gas recirculation. July 13, 2005.
1065.130 Engine exhaust. March 10, 2021 (Pre-publication).
1065.140 Dilution for gaseous and PM constituents. March 10, 2021 (Pre-publication).
1065.145 Gaseous and PM probes, transfer lines, and sampling system components. March 10, 2021 (Pre-publication).
1065.150 Continuous sampling. July 13, 2005.
1065.170 Batch sampling for gaseous and PM constituents. March 10, 2021 (Pre-publication).
1065.190 PM-stabilization and weighing environments for gravimetric analysis. September 15, 2011.
1065.195 PM-stabilization environment for in-situ analyzers. June 30, 2008.

Subpart C – Measurement Instruments

- 1065.201 Overview and general provisions. April 28, 2014.
1065.202 Data updating, recording, and control. October 25, 2016.
1065.205 Performance specifications for measurement instruments. March 10, 2021 (Pre-publication).

Measurement of Engine Parameters and Ambient Conditions

- 1065.210 Work input and output sensors. April 28, 2014.
1065.215 Pressure transducers, temperature sensors, and dewpoint sensors. June 30, 2008.

Flow-Related Measurements

- 1065.220 Fuel flow meter. March 10, 2021 (Pre-publication).
1065.225 Intake-air flow meter. March 10, 2021 (Pre-publication).
1065.230 Raw exhaust flow meter. April 28, 2014.
1065.240 Dilution air and diluted exhaust flow meters. April 28, 2014.
1065.245 Sample flow meter for batch sampling. July 13, 2005.
1065.247 Diesel exhaust fluid flow rate. March 10, 2021 (Pre-publication).
1065.248 Gas divider. July 13, 2005.

CO and CO₂ Measurements

- 1065.250 Nondispersive infra-red analyzer. April 28, 2014.

Hydrocarbon Measurements

- 1065.260 Flame ionization detector. October 25, 2016.
1. Subparagraphs (a) through (e). [No change.]
2. Delete subparagraph (f).

3. Subparagraph (g). [No change.]

1065.265 Nonmethane cutter. September 15, 2011.

1065.266 Fourier transform infrared analyzer. October 25, 2016

1. Amend subparagraph (a) as follows: Application. For engines that run only on natural gas, you may use a Fourier transform infrared (FTIR) analyzer to measure nonmethane hydrocarbon (NMHC) for continuous sampling. You may use an FTIR analyzer with any gaseous-fueled engine, including dual-fuel engines, to measure CH₄, for either batch or continuous sampling (for subtraction from THC).

2. Subparagraph (b). [No change.]

3. Amend subparagraph (c) as follows: Hydrocarbon species for NMHC additive determination. To determine NMHC, measure ethane in addition to those same hydrocarbon species. Determine NMHC as described in 40 CFR §1065.660(b)(4).

4. Amend subparagraph (d) as follows: NMHC CH₄ determination from subtraction of CH₄ from THC. Determine CH₄ as described in 40 CFR §1065.660(d)(2). Determine NMHC from subtraction of CH₄ from THC as described in 40 CFR §1065.660(b)(3). Determine CH₄ as described in 40 CFR §1065.660(d)(2).

5. Subparagraph (e). [No change.]

1065.267 Gas chromatograph with a flame ionization detector. October 25, 2016.

1065.269 Photoacoustic analyzer for ethanol and methanol. April 28, 2014.

NO_x Measurements

1065.270 Chemiluminescent detector. April 28, 2014.

1065.272 Nondispersive ultraviolet analyzer. April 28, 2014.

1065.275 N₂O measurement devices. March 10, 2021 (Pre-publication).

O₂ Measurements

1065.280 Paramagnetic and magnetopneumatic O₂ detection analyzers. March 10, 2021 (Pre-publication).

Air-to Fuel Ratio Measurements

1065.284 Zirconia (ZrO₂) analyzer. April 28, 2014.

PM Measurements

1065.290 PM gravimetric balance. November 8, 2010.

1065.295 PM inertial balance for field-testing analysis. April 28, 2014.

Subpart D – Calibrations and Verifications

- 1065.301 Overview and general provisions. July 13, 2005.
- 1065.303 Summary of required calibration and verifications. March 10, 2021 (Pre-publication).
- 1065.305 Verifications for accuracy, repeatability, and noise. April 28, 2014.
- 1065.307 Linearity verification. March 10, 2021 (Pre-publication).
- 1065.308 Continuous gas analyzer system-response and updating-recording verification – for gas analyzers not continuously compensated for other gas species. April 28, 2014.
- 1065.309 Continuous gas analyzer system-response and updating-recording verification – for gas analyzers continuously compensated for other gas species. March 10, 2021 (Pre-publication).

Measurement of Engine Parameters and Ambient Conditions

- 1065.310 Torque calibration. April 28, 2014.
- 1065.315 Pressure, temperature, and dewpoint calibration. April 28, 2014.

Flow-Related Measurements

- 1065.320 Fuel-flow calibration. July 13, 2005.
- 1065.325 Intake-flow calibration. July 13, 2005.
- 1065.330 Exhaust-flow calibration. July 13, 2005.
- 1065.340 Diluted exhaust flow (CVS) calibration. October 25, 2016.
- 1065.341 CVS, PFD, and batch sampler verification (propane check). October 25, 2016.
- 1065.342 Sample dryer verification. March 10, 2021 (Pre-publication).
- 1065.345 Vacuum-side leak verification. October 25, 2016.

CO and CO₂ Measurements

- 1065.350 H₂O interference verification for CO₂ NDIR analyzers. March 10, 2021 (Pre-publication).
- 1065.355 H₂O and CO₂ interference verification for CO NDIR analyzers. March 10, 2021 (Pre-publication).

Hydrocarbon Measurements

- 1065.360 FID optimization and verification. October 25, 2016.
1. Subparagraphs (a) through (a)(2). [No change.]
 2. Delete subparagraph (a)(3).
 3. Subparagraphs (b) through (d). [No change.]
 4. Delete subparagraph (f).

- 1065.362 Non-stoichiometric raw exhaust FID O₂ interference verification. April 28, 2014.
- 1065.365 Nonmethane cutter penetration fractions. March 10, 2021 (Pre-publication).
- 1065.366 Interference verification for FTIR analyzers. October 25, 2016
1. Amend subparagraph (a) as follows: Scope and frequency. If you measure CH₄ or NMHC using an FTIR analyzer, verify the amount of interference after initial analyzer installation and after major maintenance.
 2. Subparagraph (b). [No change.]
 3. Amend subparagraph (c) as follows: System requirements. An FTIR analyzer must have combined interference that is within $\pm 2\%$ of the flow-weighted mean concentration of CH₄ or NMHC expected at the standard, though we strongly recommend a lower interference that is within $\pm 1\%$.
 4. Subparagraph (d). [No change.]
- 1065.369 H₂O, CO, and CO₂ interference verification for photoacoustic alcohol analyzers. April 28, 2014.

NO_x Measurements

- 1065.370 CLD CO₂ and H₂O quench verification. March 10, 2021 (Pre-publication).
- 1065.372 NDUV analyzer HC and H₂O interference verification. September 15, 2011.
- 1065.375 Interference verification for N₂O analyzers. March 10, 2021 (Pre-publication).
- 1065.376 Chiller NO₂ penetration. April 28, 2014.
- 1065.378 NO₂-to-NO converter conversion verification. September 15, 2011.

PM Measurements

- 1065.390 PM balance verifications and weighing process verification. October 25, 2016.
- 1065.395 Inertial PM balance verifications. July 13, 2005.

Subpart E – Engine Selection, Preparation, and Maintenance

- 1065.401 Test engine selection. July 13, 2005.
- 1065.405 Test engine preparation and maintenance. April 28, 2014.
- 1065.410 Maintenance limits for stabilized test engines. March 10, 2021 (Pre-publication).
- 1065.415 Durability demonstration. June 30, 2008.

Subpart F – Performing an Emission Test in the Laboratory

- 1065.501 Overview. April 28, 2014.
- 1065.510 Engine mapping. March 10, 2021 (Pre-publication).
- 1065.512 Duty cycle generation. March 10, 2021 (Pre-publication).
- 1065.514 Cycle-validation criteria for operation over specified duty cycles. March 10, 2021 (Pre-publication).
- 1065.516 Sample system decontamination and preconditioning. April 28, 2014.
- 1065.518 Engine preconditioning. April 28, 2014.
- 1065.520 Pre-test verification procedures and pre-test collection. April 28, 2014.
- 1065.525 Engine starting, restarting, and shutdown. September 15, 2011.
- 1065.526 Repeating void modes or test intervals. April 28, 2014.
- 1065.530 Emission test sequence. March 10, 2021 (Pre-publication).
- 1065.545 Verification of proportional flow control for batch sampling. March 10, 2021 (Pre-publication).
- 1065.546 Verification of minimum dilution ratio for PM batch sampling. October 25, 2016.
- 1065.550 Gas analyzer range verification and drift verification. April 28, 2014.
- 1065.590 PM sampling media (e.g., filters) preconditioning and tare weighing. October 25, 2016.
- 1065.595 PM sample post-conditioning and total weighing. June 30, 2008.

Subpart G – Calculations and Data Requirements

- 1065.601 Overview. April 28, 2014.
- 1065.602 Statistics. March 10, 2021 (Pre-publication).
- 1065.610 Duty cycle generation. March 10, 2021 (Pre-publication).
- 1065.630 Local acceleration of gravity. April 28, 2014.
- 1065.640 Flow meter calibration calculations. March 10, 2021 (Pre-publication).
- 1065.642 SSV, CFV, and PDP molar flow rate calculations. March 10, 2021 (Pre-publication).
- 1065.644 Vacuum-decay leak rate. April 28, 2014.
- 1065.645 Amount of water in an ideal gas. October 25, 2016.
- 1065.650 Emission calculations. October 25, 2016.
 - 1. Subparagraphs (a) through (c)(5). [No change.]
 - 2. Delete subparagraph (c)(6).
 - 3. Subparagraphs (d) through (h). [No change.]
- 1065.655 Chemical balances of fuel, intake air, and exhaust. October 25, 2016.
- 1065.659 Removed water correction. April 28, 2014.
- 1065.660 THC, NMHC, and CH₄ determination. October 25, 2016.
 - 1. Subparagraphs (a) through (a)(2). [No change.]
 - 2. Delete subparagraph (a)(3).
 - 3. Subparagraphs (a)(4) through (b).

4. Delete subparagraph (c).
 5. Subparagraph (d). [No change.]
 6. Delete subparagraph (e).
- 1065.665 THCE and NMHCE determination. March 10, 2021 (Pre-publication).
- 1065.667 Dilution air background emission correction. March 10, 2021 (Pre-publication).
- 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. March 10, 2021 (Pre-publication).
- 1065.680 Adjusting emission levels to account for infrequently regenerating aftertreatment devices. October 25, 2016
- 1065.690 Buoyancy correction for PM sample media. October 25, 2016.
- 1065.695 Data requirements. March 10, 2021 (Pre-publication).

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

- 1065.701 General requirements for test fuels. March 10, 2021 (Pre-publication).

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. Subparagraphs (c) through (f). [No change.]

B. California provisions.

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 40 CFR Part 1065, subpart H 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” 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 28, 2014. [n/a]

1065.705 Residual fuel. April 28, 2014.

1065.710 Gasoline. February 19, 2015.

1. Subparagraph (a). [No change.]

2. Delete subparagraph (b) and replace with the following:

(b)(1) **Certification Gasoline Fuel Specifications for the 2004 through 2019 Model Years.**

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 in §1065.710(c). 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) or gasoline having the specifications in §1065.710(b), may be used in exhaust and evaporative emission testing as an option to the specifications in §1065.710(c) 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) or gasoline having the specifications in §1065.710(b), both exhaust and evaporative emission testing shall be conducted by the manufacturer with gasoline having the specifications listed in the following section (b)(2) or gasoline having the specifications in §1065.710(b), respectively, and the Executive Officer shall conduct exhaust and evaporative emission testing with gasoline having the specifications listed in the following section (b)(2) or gasoline having the specifications in §1065.710(b), respectively.

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

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

^(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.

(g) "Detailed Hydrocarbon Analysis of Petroleum Hydrocarbon Distillates, Reformates, and Gasoline by Single Column High Efficiency (Capillary) Column Gas Chromatography," by Neil Johansen, 1992, Boulder, CO.

(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 may be used in exhaust and evaporative emission testing as an option to the specifications in CFR §1065.710(b). 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. If a manufacturer elects to utilize gasoline having the specifications in CFR §1065.710(b), both exhaust and evaporative emission testing shall be conducted by the manufacturer with gasoline having the specifications in CFR §1065.710(b), and the Executive Officer shall conduct exhaust and evaporative emission testing with gasoline having the specifications in CFR §1065.710(b).

Fuel Property^(a)	Limit	Test Method ^(b)
Octane (R+M)/2 ⁽ⁱ⁾	87-88.4; 91 (min)	D 2699-88, D 2700-88
Sensitivity	7.5 (min)	D 2699-88, D 2700-88
Lead	0-0.01g/gal (max); no lead added	§2253.4(c), title 13 CCR
Distillation Range:		§2263, title 13 CCR ^(c)
10% point	130-150 °F	
50% point ^(d)	205-215 °F	
90% point ^(e)	310-320 °F	
EP, maximum	390 °F	
Residue	2.0 vol. % (max)	
Sulfur	8-11 ppm by wt.	§2263, title 13 CCR
Phosphorous	0.005 g/gal (max)	§2253.4(c), title 13 CCR
RVP	6.9-7.2 psi	§2263, title 13 CCR
Olefins	4.0-6.0 vol. %	§2263, title 13 CCR
Total Aromatic Hydrocarbons	19.5-22.5 vol. %	§2263, title 13 CCR
Benzene	0.6-0.8 vol. % ^(f)	§2263, title 13 CCR
Multi-substituted Alkyl Aromatic Hydrocarbons	13-15 vol. % ^(g)	
MTBE	0.05 vol. %	§2263, title 13 CCR
Ethanol	9.2-10.0 vol. %	§2263, title 13 CCR
Total Oxygen	3.3-3.7 wt. %	§2263, title 13 CCR
Additives	Sufficient to meet requirements of §2257, title 13 CCR	
Copper Corrosion	No. 1	D 130-88
Gum, washed	3.0 mg/100 mL (max)	D 381-86
Oxidation Stability	1000 minutes (min)	D 525-88
Specific Gravity	Report ^(h)	
Heat of Combustion	Report ^(h)	
Carbon	Report wt. % ^(h)	
Hydrogen	Report wt. % ^(h)	

- (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.
- (g) "Detailed Hydrocarbon Analysis of Petroleum Hydrocarbon Distillates, Reformates, and Gasoline by Single Column High Efficiency (Capillary) Column Gas Chromatography," by Neil Johansen, 1992, Boulder, CO.
- (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.

1065.715 Natural gas. April 28, 2014.

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:

Compressed Natural Gas Certification Test Fuel

Specification	Limit
Methane	90.0 ± 1.0 mole percent
Ethane	4.0 ± 0.5 mole percent
C ₃ and higher hydrocarbon content	2.0 ± 0.3 mole percent
Oxygen	0.5 mole percent maximum
Inert gases (CO ₂ + N ₂)	3.5 ± 0.5 vol. percent

- (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.]

1065.720 Liquefied petroleum gas. April 28, 2014.

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

Specification	Limit
Propane	93.5 ± 1.0 volume percent
Propene	3.8 ± 0.5 volume percent
Butane and heavier components	1.9 ± 0.3 volume percent

(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.]

1065.725 High-level ethanol-gasoline blends. April 28, 2014.

A. Federal provisions. [No change.]

B. California provisions.

1. California Alcohol Certification Fuel Specifications.

1.1 **Emission test fuel.** For Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles which use Otto-cycle or diesel alcohol engines, methanol or ethanol fuel used for exhaust and evaporative emission testing shall meet the specifications set forth in section 2292.1, title 13, CCR, (Specifications for M-100 Fuel Methanol) or section 2292.3 (Specification for E-100 Fuel Ethanol) as modified by the following:

Specification	Limit
M-100 Fuel Methanol	
Methanol	98.0 ± 0.5 vol. percent
Ethanol	1.0 vol. percent max.
Petroleum fuel meeting the specifications of §1065.710 as modified in subparagraph 2(b)(1).	1.0 ± 0.1 vol. percent

E-100 Fuel Ethanol	
Ethanol	98.0 ± 0.5 vol. percent
Methanol	1.0 vol. percent max.
Petroleum fuel meeting the specifications of §1065.710 as modified in subparagraph 2(b)(1).	1.0 ± 0.1 vol. percent

1.2 **Mileage accumulation fuel.** For Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles which use Otto-cycle or diesel alcohol engines, methanol or ethanol fuel used for service accumulation shall meet the applicable specifications set forth in section 2292.1, title 13, CCR, (Specifications for M-100 Fuel Methanol) or section 2292.3 (Specification for E-100 Fuel Ethanol).

1.3 Fuel additives and ignition improvers intended for use in alcohol test fuels shall be subject to the approval of the Executive Officer. In order for such approval to be granted, a manufacturer must demonstrate that emissions will not be adversely affected by the use of the fuel additive or ignition improver.

2 California Certification Fuel Specifications – Mixtures of Petroleum and Alcohol Fuels for Flexible Fuel Vehicles.

2.1 **Exhaust emission test fuel for emission-data and durability-data vehicles.** For Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles which use Otto-cycle or diesel alcohol engines, methanol or ethanol fuel used for exhaust emission testing shall meet the applicable specifications set forth in section 2292.2, title 13, CCR, (Specifications for M-85 Fuel Methanol) or section 2292.4 (Specifications for E-85 Fuel Ethanol) as modified by the following. E-85 that meets the specifications in §1065.725 may be used in exhaust and evaporative emission testing as an option to the E-85 Fuel Ethanol specifications in this subparagraph. If a manufacturer elects to utilize E-85 Fuel Ethanol having the specifications listed below, the Executive Officer shall conduct exhaust emission testing with E-85 Fuel Ethanol having the specifications listed below. If a manufacturer elects to utilize E-85 Fuel Ethanol having the specifications set forth in 40 CFR §1065.725, the Executive Officer shall conduct exhaust emission testing with E-85 Fuel Ethanol having the specifications set forth in 40 CFR §1065.725.

Specification	Limit
M-85 Fuel Methanol	
Petroleum fuel meeting the specifications of §1065.710 as modified in subparagraph 2(b)(1).	13-16 vol. percent
Reid vapor pressure	8.0-8.5 psi, using common blending components from the gasoline stream.
E-85 Fuel Ethanol	
Petroleum fuel meeting the specifications of §1065.710 as modified in subparagraph 2(b)(1).	15-21 vol. percent
Reid vapor pressure	8.0-8.5 psi, using common blending components from the gasoline stream.

2.2 Mileage accumulation fuel. For flexible fuel Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles that use Otto-cycle or diesel alcohol engines, petroleum fuel shall meet the applicable specifications in §1065.710, as modified in §1065.710 subparagraph 2, above, and methanol or ethanol fuel shall meet the applicable specifications set forth in section 2292.2, title 13, CCR, (Specifications for M-85 Fuel Methanol) or section 2292.4 (Specification for E-85 Fuel Ethanol). Mileage accumulation procedures shall be subject to the requirements set forth in 40 CFR §86.004-26 and §86.1831-01(a) and (b) and are subject to the prior approval of the Executive Officer. A manufacturer shall consider expected customer fuel usage as well as emissions deterioration when developing its durability demonstration.

2.3 Evaporative emission test fuel for emission-data and durability-data vehicles. For Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles which use Otto-cycle or diesel alcohol engines, a blend of methanol or ethanol fuel used for evaporative emission testing shall meet the applicable specifications set forth in section 2292.2, title 13, CCR, (Specifications for M-85 Fuel Methanol) or section 2292.4 (Specifications for E-85 Fuel Ethanol) and gasoline meeting the specifications of §1065.710, as modified in §1065.710 subparagraph 2, above, such that the final blend is composed of either 35 volume percent methanol (± 1.0 volume percent of total blend) for methanol-fueled vehicles or 10 volume percent ethanol (± 1.0 volume percent of total blend) for ethanol-fueled vehicles. Alternative alcohol-gasoline blends may be used in place of M35 or E10 if demonstrated to result in equivalent or higher evaporative emissions, subject to prior approval of the Executive Officer.

2.4 Additive requirements. Fuel additives and ignition improvers intended for use in alcohol test fuels shall be subject to the approval of the Executive Officer. In order for such approval to be granted, a manufacturer must

demonstrate that emissions will not be adversely affected by the use of the fuel additive or ignition improver.

- 1065.735 Diesel exhaust fluid. [n/a]
- 1065.740 Lubricants. July 13, 2005.
- 1065.745 Coolants. July 13, 2005.
- 1065.750 Analytical gases. October 25, 2016.
- 1065.790 Mass standards. March 10, 2021 (Pre-publication).

Subpart I – Testing with Oxygenated Fuels.

- 1065.801 Applicability. July 13, 2005.
- 1065.805 Sampling system. April 28, 2014.
- 1065.845 Response factor determination. October 25, 2016.
- 1065.850 Calculations. April 28, 2014.

Subpart J- Field Testing and Portable Emission Measurement Systems

- 1065.910 PEMS auxiliary equipment for field testing. March 10, 2021 (Pre-publication).

Subpart K – Definitions and Other Reference Information.

- 1065.1001 Definitions. October 25, 2016.
 - 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.
 - 2. Amend the definition of “Hydrocarbon” as follows: *Hydrocarbon (HC)* means THC, THCE, NMHC, NMOG, or NMHCE, as applicable. Hydrocarbon generally means the hydrocarbon group on which the emission standards are based for each type of fuel and engine.
 - 3. Delete the definition of “Nonmethane nonethane hydrocarbon (NMNEHC).”
- 1065.1005 Symbols, abbreviations, acronyms, and units of measure. October 25, 2016.
 - A. Federal Provisions.** [No change.]
 - B. California Provisions.**
ARB means Air Resources Board.
- 1065.1010 Reference materials. October 25, 2016.

Subpart L – Methods for Unregulated and Special Pollutants

1065.1101 Applicability. April 28, 2014.

Semi-Volatile Organic Compounds

1065.1103 General provisions for SVOC measurement. April 28, 2014.

1065.1105 Sampling system design. October 25, 2016.

1065.1107 Sample media and sample system preparation; sample system assembly.
October 25, 2016.

1065.1109 Post-test sampler disassembly and sample extraction. October 25, 2016.

1065.1111 Sample analysis. April 28, 2014.

PART 1068 – GENERAL COMPLIANCE PROVISIONS FOR HIGHWAY, STATIONARY, AND NONROAD PROGRAMS

Subpart A – Applicability and Miscellaneous Provisions

- 1068.1 Does this part apply to me? October 25, 2016.
1. Subparagraph (a) to (a)(1). [No change.]
 2. Amend (a)(2) as follows: This part 1068 applies to heavy-duty motor vehicles and motor vehicle engines used in such vehicles, that are subject to the emission standards in title 13, CCR, section 1956.8.
 3. Delete subparagraphs (a)(3) through (d).
- 1068.5 How must manufacturers apply good engineering judgment? October 8, 2008.
1. Subparagraph (a) through (d). [No change.]
 2. Delete subparagraph (e).
- 1068.20 May ARB enter my facilities for inspections? October 25, 2016.
1. Delete subparagraph (a) and replace with: We may inspect your testing, manufacturing processes, storage facilities (including port facilities for imported engines and equipment or other relevant facilities), or records, as authorized by the California Health and Safety Code (Division 25.5 and Part 5, Division 26), to enforce the provisions of this chapter. Inspectors will have authorizing credentials and will usually limit inspections to normal operating hours.
 2. Subparagraph (b). [No change.]
 3. Delete subparagraph (c) and replace with: Any ARB Enforcement Officer must be furnished by those in charge of a facility being inspected with such reasonable assistance as may be necessary to discharge any function listed in this paragraph. Each applicant for or recipient of certification is required to cause those in charge of a facility operated for its benefit to furnish such reasonable assistance without charge to the ARB irrespective of whether or not the applicant controls the facility.
 4. Delete subparagraph (d) and replace with: The duty to admit or cause to be admitted any ARB Enforcement Officer applies whether or not the applicant owns or controls the facility in question and applies both to domestic and foreign engine and vehicle manufacturers and facilities. The ARB will not attempt to make any inspections that it has been informed that local law forbids. However, if local law makes it impossible to insure the accuracy of data generated at a facility, no informed judgment that an engine or vehicle is certifiable or is covered by an Executive Order can properly be based on the data. It is the responsibility of the engine manufacturer or vehicle manufacturer to locate its testing and manufacturing facilities in jurisdictions where this situation will not arise.

1068.30 Definitions. October 25, 2016.

A. Federal Provisions. [All federal definitions apply, except as otherwise noted below.]

Date of manufacture: Delete and replace with:

Date of manufacture means one of the following:

(1) For engines, the date on which the crankshaft is installed in an engine block, with the following exception:

(i) Manufacturers may assign a date of manufacture at a point in the assembly process later than the date otherwise specified under this definition. For example, a manufacturer may use the build date printed on the label or stamped on the engine as the date of manufacture.

Engine: Delete

B. California Provisions.

“Administrator” means the Executive Officer of the Air Resources Board, or a designee of the Executive Officer.

“Certificate of Conformity” means an Executive Order certifying engines for sale in California.

“Certification” means relating to the process of obtaining an Executive Order for an engine family that complies with the emission standards and requirements in this part.

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

“EPA” shall also mean Air Resources Board or Executive Officer of the Air Resources Board.

“Standard-setting part” means the articles of the California Code of Regulations that define emission standards for a particular engine.

“United States” in reference to vehicle or engine sales or vehicle or engine introduced into commerce means the vehicle or engine sales or vehicle or engine introduced into commerce in California.

“We (us, our)” means the Executive Officer and any authorized representatives.

1068.35 Symbols, acronyms, and abbreviations. October 8, 2008.

A. Federal Provisions. [No change.]

B. California Provisions.

ARB means Air Resources Board.

1068.45 General labeling provisions. October 25, 2016.

Subpart E – Selective Enforcement Auditing

- 1068.401 What is a selective enforcement audit? October 25, 2016.
- 1068.405 What is in a test order? October 25, 2016.
- 1068.410 How must I select and prepare my engines/equipment? April 30, 2010.
- 1068.415 How do I test my engines/equipment? October 25, 2016.
- 1068.420 How do I know when my engine family fails an SEA? October 25, 2016.
- 1068.425 What happens if one of my production-line engines/equipment exceeds the emission standards? October 25, 2016.
- 1068.430 What happens if a family fails an SEA? October 25, 2016.
- 1068.435 May I sell engines/equipment from a family with a suspended certificate of conformity? October 8, 2008.
- 1068.440 How do I ask ARB to reinstate my suspended certificate? April 30, 2010.
- 1068.445 When may ARB revoke my certificate under this subpart and how may I sell these engines/equipment again? October 8, 2008.
- 1068.450 What records must I send to ARB? October 25, 2016.
- 1068.455 What records must I keep? October 8, 2008.