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Proposed Second 15-Day Modifications to the Otto-Cycle Test Procedures

California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles

Date of Release: June 2021; Proposed 2nd 15-Day Notice
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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: [Insert Date of Amendment]

Note: The originally proposed regulatory language is shown in ~~strikethrough~~ to indicate deletions and underline to indicate additions. New deletions and additions to the proposed language that were made public with the 30-Day Notice are shown in ~~double strikethrough~~ and double underline format, respectively. New additions and deletions to the proposed language that are made public with this notice are shown in ***bold italic double underline*** and ~~***bold italic double strikethrough***~~, respectively. Subsections for which no changes are proposed in this rulemaking are indicated with [No change] or “*
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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);
34. OBD II (sections 1968, et seq., title 13, CCR, as applicable);
5. HD OBD (sections 1971, et seq., title 13, CCR, as applicable);
46. “California Test Procedures for Evaluating Substitute Fuels and New Clean Fuels through 2014,” (incorporated by reference in section 2317, title 13, CCR); and
57. “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).

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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.

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST 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.

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2. Definitions. [§86.xxx-2]

A. Federal Provisions.

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B. California Provisions.

~~“50 state directed engines” means the entire volume of new heavy duty Otto cycle and diesel engines produced by a manufacturer and intended for sale in the United States of America in a given model year, from 2024 through 2026 model years, used in medium duty vehicles from 10,001 – 14,000 pounds GVWR, heavy duty vehicles over 14,000 pounds GVWR, and hybrid powertrains that are certified to the standards and test procedures of title 13, CCR, section 1956.8.~~

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

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“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, or new vehicles or powertrains sold to an ultimate purchaser in a given model year within 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

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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. 0.20 g/bhp-hr emission standard for 2007 and subsequent the engine model engines. The optional low NOx emission standards are 0.10, 0.05, or 0.02 g/bhp-hr.

“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) ~~October 25, 2016.~~

“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.

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3. Abbreviations. [§86.xxx-3]

A. Federal provisions.

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B. California provisions.

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

A. Federal provisions.

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B. California provisions.

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12. Alternative certification procedures. [§86.080-12]. April 17, 1980.

A. Federal provisions. [No change].

B. California provisions.

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

A. Federal provisions.

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

B. California provisions.

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

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that certify products in California must enroll in the CA-ABT program. ~~California-Certified Heavy-duty zero-emission vehicle powertrain families can participate in the CA-ABT program~~ subject to the provisions of subparagraph 1.15.B.2.(i) of these test procedures for NO_x only. 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 ~~for NO_x only~~ 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 ~~for NO_x~~ can be transferred into any other averaging set such as the heavy-duty Otto-cycle averaging set ~~only in order~~ to cover deficits ~~generated by any certified engine families in that averaging set. For example, if the heavy-duty Otto-cycle averaging set for NO_x does not have any deficits, credits from the heavy-duty zero-emission averaging set for NO_x would not be eligible for transferring into the heavy-duty Otto-cycle averaging set for NO_x.~~

(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

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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:

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

where:

t₁ = 2019 model year.

t₂ = 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:

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

where:

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

Std = the ~~applicable~~ **current model year** FTP cycle NO_x or NMHC emission standard in grams per brake horsepower hour ~~for the applicable model year~~. **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

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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 ~~for NO_x only~~ ~~Zero-emission vehicle powertrain manufacturers that certify 2022 through 2030~~ ~~2026 model year~~ class 4 through class 8 ~~Zero-emission vehicle powertrain families with models used in class 4 through 8 vehicles under title 17, CCR, section 95663~~ ~~title 13, CCR, section 1956.8(a)(8)~~ are eligible to generate NO_x **and NMHC** credits in the heavy-duty zero-emission averaging set under the CA-ABT program. ~~In order to generate credits, vehicle manufacturers must include only vehicle families that use zero-emission powertrain families certified under title 13, CCR, section 1956.8(a)(8) in the CA-ABT calculations. 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 ~~subject to the credit life provisions in subparagraph B.2.g of this section,~~ 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 ~~vehicle~~ powertrain model within a powertrain family shall be calculated using the following equation:

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

where:

Zero-emission ~~NO_x~~ credits are calculated for each ~~certified~~ zero-emission ~~vehicle powertrain~~ model within the ~~vehicle 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 ~~vehicle powertrain family~~ 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) ~~October 25, 2016~~, which is incorporated by reference herein.

Sales = California sales volume for the zero-emission ~~vehicle powertrain models~~ sold within the given ~~vehicle 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 ~~for NO_x~~ are only available for 2022 through ~~2030~~2026 model years. Any banked zero-emission ~~NO_x~~ credits would no longer be available in the CA-ABT program for ~~2031~~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.

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(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 ~~vehicle~~ 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 ~~90~~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 ~~vehicle~~ 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 ~~180~~90 days subsequent to submission of the end-of-year report. Errors discovered by ARB after ~~180~~90 days shall be corrected if credits are reduced. Errors in the manufacturer's favor will not be corrected if discovered after the ~~180~~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 ~~vehicles~~ 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 ~~vehicle~~ 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,

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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 ~~emission standards~~, 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:

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

* 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-vehicle powertrain families are not eligible for early compliance credit multipliers.

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

A. Federal provisions.

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B. California provisions.

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25. Maintenance. [§86.xxx-25]

A. Federal provisions.

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30. Certification. [§86.xxx-30].

A. Federal Provisions

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B. California Provisions

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35. Labeling. [§86.xxx-35]

A. Federal provisions.

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B. California Provisions

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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

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B. California Provisions

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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? ~~October 25, 2016~~ ~~May 12, 2020~~ March 10, 2021 (Pre-publication).

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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.

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1036.115 Other requirements. October 25, 2016.

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

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1036.135 Labeling. October 25, 2016.

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

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1036.150 Interim provisions. October 25, 2016.

Subpart C – Certifying Engine Families

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

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1036.210 Preliminary approval before certification. October 25, 2016.

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Subpart D – Testing Production Engines and Hybrid Powertrains

1036.301 Measurements related to GEM inputs in a selective enforcement audit.
~~October 25, 2016~~ March 10, 2021 (Pre-publication).

Subpart E – In-use Testing

1036.401 In-use testing. October 25, 2016.

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Subpart F – Test Procedures

1036.501 How do I run a valid emission test? ~~October 25, 2016~~ ~~May 12, 2020~~ March 10, 2021 (Pre-publication).

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1036.503 Engine data and information for vehicle certification. ~~May 12, 2020~~ March 10, 2021 (Pre-publication).

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1036.510 ~~Engine data and information for vehicle certification.~~ Transient Testing procedures. ~~October 25, 2016~~ ~~May 12, 2020~~ March 10, 2021 (Pre-publication).

1036.525 Hybrid engines. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

1036.527 Powertrain system rated power determination. ~~May 12, 2020~~ March 10, 2021 (Pre-publication).

1036.530 Calculating greenhouse gas emission rates. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

1036.535 Determining steady-state engine fuel maps and fuel consumption at idle. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

1036.540 Determining cycle-average engine fuel maps. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

1036.543 Carbon balance error verification. ~~May 12, 2020~~ March 10, 2021 (Pre-publication).

Subpart G – Special Compliance Provisions

1036.601 What compliance provisions apply? October 25, 2016.

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1036.605 GHG exemption for engines used in specialty vehicles. October 25, 2016.

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1036.610 Off-cycle technology credits and adjustments for reducing greenhouse gas emissions. October 25, 2016.

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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.

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1036.705 Generating and calculating emission credits. ~~October 25, 2016~~ 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]

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Subpart I – Definitions and Other Reference Information

1036.801 Definitions. ~~October 25, 2016~~ ~~May 12, 2020~~ March 10, 2021 (Pre-publication).

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

B. California Provisions.

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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. ~~October 25, 2016~~ 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.

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1036.825 Reporting and recordkeeping requirements. October 25, 2016.

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

2. Delete subparagraph (e).

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Appendix I to Part 1036 - Default Engine Fuel Maps for 40 CFR § 1036.540. ~~October 25, 2016.~~ ~~Summary of Previous Emission Standards.~~ ~~May 12, 2020~~ March 10, 2021 (Pre-publication).

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Appendix II to Part 1036 – Transient Duty Cycles. ~~May 12, 2020~~ March 10, 2021 (Pre-publication).

Appendix III to Part 1036 – Default Engine Fuel Maps for 40 CFR §1036.540. ~~May 12, 2020~~ March 10, 2021 (Pre-publication).

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PART 1065 – ENGINE-TESTING PROCEDURES.

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Subpart B – Equipment Specifications

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1065.130 Engine exhaust. ~~April 28, 2014~~ March 10, 2021 (Pre-publication).

1065.140 Dilution for gaseous and PM constituents. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

1065.145 Gaseous and PM probes, transfer lines, and sampling system components. ~~April 28, 2014~~ March 10, 2021 (Pre-publication).

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1065.170 Batch sampling for gaseous and PM constituents. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

Subpart C – Measurement Instruments

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1065.205 Performance specifications for measurement instruments. ~~April 28, 2014~~ March 10, 2021 (Pre-publication).

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Flow-Related Measurements

1065.220 Fuel flow meter. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

1065.225 Intake-air flow meter. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

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1065.247 Diesel exhaust fluid flow rate. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

NOx Measurements

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1065.275 N₂O measurement devices. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

O₂ Measurements

1065.280 Paramagnetic and magnetopneumatic O₂ detection analyzers. ~~April 28, 2014~~ March 10, 2021 (Pre-publication).

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Subpart D – Calibrations and Verifications

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1065.303 Summary of required calibration and verifications. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

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1065.307 Linearity verification. ~~April 28, 2014~~ March 10, 2021 (Pre-publication).

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1065.309 Continuous gas analyzer system-response and updating-recording verification – for gas analyzers continuously compensated for other gas species. ~~April 28, 2014~~ March 10, 2021 (Pre-publication).

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Flow-Related Measurements

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1065.342 Sample dryer verification. ~~April 30, 2010~~ March 10, 2021 (Pre-publication).

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CO and CO₂ Measurements

1065.350 H₂O interference verification for CO₂ NDIR analyzers. ~~April 28, 2014~~ March 10, 2021 (Pre-publication).

1065.355 H₂O and CO₂ interference verification for CO NDIR analyzers. ~~April 28, 2014~~ March 10, 2021 (Pre-publication).

Hydrocarbon Measurements

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1065.365 Nonmethane cutter penetration fractions. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

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NO_x Measurements

1065.370 CLD CO₂ and H₂O quench verification. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

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1065.375 Interference verification for N₂O analyzers. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

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Subpart E – Engine Selection, Preparation, and Maintenance

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1065.410 Maintenance limits for stabilized test engines. ~~February 19, 2015~~ March 10, 2021 (Pre-publication).

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Subpart F – Performing an Emission Test in the Laboratory

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1065.510 Engine mapping. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

1065.512 Duty cycle generation. ~~April 28, 2014~~ March 10, 2021 (Pre-publication).

1065.514 Cycle-validation criteria for operation over specified duty cycles.
~~September 15, 2014~~ March 10, 2021 (Pre-publication).

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1065.530 Emission test sequence. ~~April 28, 2014~~ March 10, 2021 (Pre-publication).

1065.545 Verification of proportional flow control for batch sampling. ~~April 28, 2014~~ March 10, 2021 (Pre-publication).

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Subpart G – Calculations and Data Requirements

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1065.602 Statistics. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

1065.610 Duty cycle generation. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

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1065.640 Flow meter calibration calculations. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

1065.642 SSV, CFV, and PDP molar flow rate calculations. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

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1065.665 THCE and NMHCE determination. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

1065.667 Dilution air background emission correction. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

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1065.675 CLD quench verification calculations. ~~October 25, 2016~~ March 10, 2021 (Pre-publication).

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1065.695 Data requirements. ~~April 28, 2014~~ March 10, 2021 (Pre-publication).

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

1065.701 General requirements for test fuels. ~~April 28, 2014~~ March 10, 2021 (Pre-publication).

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1065.790 Mass standards. ~~September 15, 2011~~ March 10, 2021 (Pre-publication).

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Subpart J- Field Testing and Portable Emission Measurement Systems

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1065.910 PEMS auxiliary equipment for field testing. ~~April 30, 2010~~ March 10, 2021 (Pre-publication).

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

Subpart A – Applicability and Miscellaneous Provisions

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1068.5 How must manufacturers apply good engineering judgment? October 8, 2008.

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

2. Delete subparagraph (e).

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