

Appendix B-1

Proposed Modifications to the Diesel Engine Test Procedures

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

[Note: The proposed modifications, referred to as 15-Day Changes, to the originally proposed test procedures are shown below. This version (Appendix B-1) complies with Government Code sections 11346.2, subdivision (a)(3), and 11346.8, subdivision (c). The originally proposed test procedures made available August 1, 2023, for public comment for at least 45 days (from August 4, 2023, to September 18, 2023) referred to as the 45-Day Changes, is incorporated into this version as plain, clean text (shown in “normal type”) because it is not being made available for public comment by this Notice. The deletions and additions to the originally proposed language that comprise the 15-day Changes that are made public with this Notice and available for comment are shown in strikethrough to indicate deletions and underline to indicate additions. Vertical lines in the left margins are to flag where changes are proposed and are not part of the proposed amendments. The 15-Day Changes are being presented in multiple versions. For ease of readability, and to review these 15-Day Changes in an Accessible format, please refer to the Word (.docx) version (Appendix B-2).]

Appendix B-1

State of California
AIR RESOURCES BOARD

Proposed

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

Adopted: December 12, 2002
Amended: July 24, 2003
Amended: September 1, 2006
Amended: July 26, 2007
Amended: October 17, 2007
Amended: October 14, 2008
Amended: September 27, 2010
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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: April 18, 2019
Amended: September 9, 2021
Amended: [Insert Date of Amendment]

NOTE: This document is incorporated by reference in section 1956.8(b), 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 diesel engines for sale in California, in addition to containing the exhaust emissions standards and test procedures for these diesel engines.¹ The section numbering conventions for this document are set forth in subparagraph 4 on page 6. Reference is also made in this document to other California-specific requirements that are necessary to complete an application for certification. These other documents are designed to be used in conjunction with this document. They include:

1. “California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles,” (incorporated by reference in section 1976, title 13, CCR);
2. Warranty requirements (sections 2035, et seq., title 13, CCR);
3. Warranty requirements (sections 2036, et seq., title 13, CCR);
4. OBD II (section 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 diesel 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 DIESEL ENGINES AND VEHICLES**

The following provisions of Subparts A, I, N, S, and T, 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, as adopted or amended by the U.S. Environmental Protection Agency on the date set forth next to the applicable section listed below, and only to the extent they pertain to the testing and compliance of exhaust emissions from heavy-duty diesel engines and vehicles, are adopted and incorporated herein by this reference as the “California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles,” except as altered or replaced by the provisions set forth below.

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

**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.

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

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11. Emission standards for diesel heavy-duty engines and vehicles. [§86.xxx-11]

A. Federal provisions.

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B. California provisions.

1. Urban Bus Standards.

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5. Standards for Heavy-Duty Engines.

5.1 Requirements Specific to Heavy-Duty Engines Used in Medium-Duty Vehicles 8,501 to 10,000 pounds GVW.

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5.3 Exhaust Emission Standards for Heavy-Duty Engines.

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5.3.5 Legacy Engine Option. For 2024, 2025, and 2026 model year heavy-duty diesel engine families rated below 525 bhp maximum power as defined in 40 CFR §1065.510, a manufacturer may elect to certify a heavy-duty diesel engine family or families with $0.100 < \text{FTP NO}_x \text{ FEL} \leq 0.20 \text{ g/bhp-hr}$, and $0.005 < \text{FTP PM FEL} \leq 0.01 \text{ g/bhp-hr}$ if it meets the criteria set forth below in subparagraphs 5.3.5.1 and 5.3.5.2 below:

* * * *

5.3.5.2. A manufacturer is only eligible to utilize this option if it meets all criteria identified in subparagraphs (a) through (f) below.

(a) The manufacturer must certify the engine family subject to the averaging, trading and banking provisions in subparagraph I.15.B.3. of these test procedures.

* * * *

(c) **Procedure to Offset Deficit Balance.** The manufacturer must offset its model year NO_x and PM deficit balance generated by legacy engines by using credits from the heavy-duty zero-emission averaging set described in subparagraph I.15.B.3.(j) of these test procedures.

(1) **Credits from the Same Averaging Set.** If a sufficient quantity of heavy-duty zero-emission NO_x or PM credits are not

available, or are only available for a cost exceeding \$4,000 (for enough NOx or PM credits to offset one medium heavy-duty legacy engine), the manufacturer may submit a plan for Executive Officer approval to use credits from the same averaging set described in subparagraph I.15.B.3.(a) of these test procedures to offset any remaining model year deficit balance generated by legacy engines. The plan must include information describing the manufacturer's attempts to purchase heavy-duty zero-emission NOx or PM credits from all manufacturers who have certified heavy-duty zero-emission vehicles or powertrains with CARB and that the manufacturer was denied a fair market offer to purchase such credits (i.e., such credits were only available at a cost exceeding \$4,000 for enough NOx or PM credits to offset one medium heavy-duty legacy engine). The Executive Officer will base his or her determination upon the information included in the plan and the exercise of good engineering judgment that the information substantiates that sufficient heavy-duty zero-emission NOx or PM credits were not available or were only available at a cost exceeding \$4,000 (for enough NOx or PM credits to offset one medium heavy-duty legacy engine).

(2) **Carryover to the 2026 Model Year.** If credits from the same averaging set described in subparagraph I.15.B.3.(a) of these test procedures are not available, the manufacturer may carryover the NOx or PM deficit balance generated by legacy engines until the end of the 2026 model year, provided the manufacturer offsets the remaining legacy engine generated deficit balance times 1.25 with credits from the heavy-duty zero-emission averaging set or the same averaging set described in subparagraph I.15.B.3.(a) of these test procedures by the end of the 2026 model year. For example, if the deficit carried over from the 2025 model year to the 2026 model year is 1 Mg, the manufacturer would need to offset the deficit with 1.25 Mg by the end of the 2026 model year.

(3) **Projects Targeted at California Disadvantaged Communities.** If at the end of the 2026 model year, a sufficient quantity of heavy-duty zero-emission NOx or PM credits are not available for the manufacturer to offset the remaining legacy engine generated deficit balance times 1.25, the manufacturer must take all the actions in (i) to (iii) below for the remaining NOx or PM balance. For example, if the remaining deficit balance is 1 Mg NOx, the manufacturer would need to offset the deficit balance with 1.25 Mg NOx.

As an option, the manufacturer may utilize this provision in the 2024 and 2025 model years if a sufficient quantity of heavy-duty zero-emission NOx or PM credits are not available for the manufacturer to offset the remaining legacy engine generated deficit

balance times 1.25. For example, if the remaining deficit balance is 1 Mg NO_x, the manufacturer would need to offset the deficit balance with 1.25 Mg NO_x.

(i) Provide documentation to the Executive Officer substantiating that the manufacturer has attempted to purchase heavy-duty NO_x or PM credits from all manufacturers with such credits and was denied a fair market offer: i.e. exceeding \$4,000 for enough NO_x or PM credits to offset one medium heavy-duty legacy engine.

(ii) Submit a plan for Executive Officer approval for projects targeted at California disadvantaged communities and that are sufficient to offset the excess emissions within 5 years. The plan must include project descriptions and budgets and a demonstration that the projects will achieve reductions required. The Executive Officer will base his or her determination upon the documentation provided by the manufacturer and the exercise of good engineering judgment that the plan would benefit disadvantaged communities, and would fully offset the excess emissions due to the credit deficit balance within 5 years. The manufacturer may submit contingency plans to be assessed and approved on the same standard as set forth in this subsection.

(iii) At the end of the 5-year period, the manufacturer must submit information documenting that the excess emissions have been offset. Failure to do so means that legacy engines would be subject to the provisions of §86.004-15.A.(b)(5) of these test procedures.

(4) Carryover to the 2025 Model Year. The manufacturer may carry over the NO_x or PM deficit balance generated by legacy engines from the 2024 model year to the 2025 model year, provided the manufacturer offsets the deficit balance with credits from the heavy-duty zero-emission averaging set. For example, if the deficit balance carried over from the 2024 model year to the 2025 model year is 1 Mg, the manufacturer would need to offset the deficit with 1 Mg of heavy-duty zero-emission averaging set credits by the end of the 2025 model year.

(d) Legacy Engine Sales Limits. A manufacturer may choose Option 1 or, if eligible, Option 2, and must remain in the same chosen option for model years 2024, 2025, and 2026. Option 2 is only available to a certifying manufacturer if it certifies medium heavy-duty diesel engines in addition to certifying products in another heavy-duty diesel primary intended service class for model years 2024 and 2025. For example, a

manufacturer is eligible to use this option if it certifies both medium heavy-duty diesel engines and heavy heavy-duty diesel engines in the 2024 and 2025 model years. For both Options 1 and 2, the legacy engine sales limits in subsections 1 and 2 below are based on the total actual California sales of heavy-duty diesel engines, which is the combined total of all light heavy-duty (including medium-duty engines), medium heavy-duty, and heavy heavy-duty diesel engines that are sold in California.

(1) **Option 1.** For each certifying heavy-duty diesel engine manufacturer, the total California sales volume of legacy engines certified under this provision may not exceed 45 percent of the manufacturer's total actual California sales of heavy-duty diesel engines for 2024 model year, 25 percent of the manufacturer's total actual California sales of heavy-duty diesel engines for 2025 model year, and 10 percent of the manufacturer's total actual California sales of heavy-duty diesel engines for 2026 model year. For example, a manufacturer that sells a total of 1,000 heavy-duty diesel engines in California in 2024 model year would be allowed to sell up to 450 heavy-duty diesel legacy engines for that model year in California.

If a manufacturer exceeds the legacy engine sales limits in Option 1 for a given model year, the maximum percentage exceeding the allowable sales limits without being considered non-compliant in engine sales is 1 percent above a given legacy engine sales limit. The excess NOx ~~or~~ and PM emissions from this percentage of heavy-duty legacy engines exceeding the allowable legacy engine sales limits must be offset at 4 times the deficit balance. For example, if the deficit balance of the percentage above a given legacy engine sales limit is 1 Mg NOx, the manufacturer would need to offset the deficit with 4 Mg NOx. All legacy engine sales above the legacy engine sales limits in Option 1 plus the 1 percent sales exceedance will be considered non-compliant engine sales. For example, if at the end of 2024 model year, a manufacturer using Option 1 determines that it has sold 1,000 heavy-duty diesel engines in California of which 500 are legacy engines, then the manufacturer must offset the deficit from 450 legacy engines at the normal rate (as used in subsection I.11.B.5.3.5.2.(c) *Procedure to Offset Deficit Balance*) plus the deficit from 10 legacy engines (i.e., 1,000 engines x 1 percent) at 4 times the normal rate. The remaining 40 legacy engines would be considered non-compliant.

(2) **Option 2.** The following requirements apply to each eligible certifying heavy-duty diesel engine manufacturer using Option 2.

(i) The total California sales volume of medium heavy-duty diesel legacy engines under this provision may not exceed 60 percent of the manufacturer's total actual California sales of heavy-duty diesel engines for 2024 model year, and 60 percent of the

manufacturer's total actual California sales of heavy-duty diesel engines for 2025 model year. No legacy engine sales are allowed in 2026 model year. For example, a manufacturer that sells a total of 1,000 heavy-duty diesel engines in California in 2024 model year would be allowed to sell up to 600 medium heavy-duty diesel legacy engines for that model year in California.

(ii) The total combined California sales volume of light heavy-duty and heavy heavy-duty diesel legacy engines certified under this provision may not exceed 15 percent of the manufacturer's total actual California sales of heavy-duty diesel engines for 2024 model year and 8 percent of the manufacturer's total actual California sales of heavy-duty diesel engines for 2025 model year. No legacy engine sales are allowed in 2026 model year. For example, a manufacturer that sells a total of 1,000 heavy-duty diesel engines in California in 2024 model year may sell up to 150 light heavy-duty and heavy heavy-duty diesel legacy engines combined for that model year in California.

(iii) If a manufacturer exceeds the legacy engine sales limits in Option 2 for 2024 or 2025 model years, the maximum percentage exceeding the allowable sales limits without being considered non-compliant is 5 percent for medium heavy-duty diesel engines and 1 percent for the combined light heavy-duty and heavy heavy-duty diesel engines above a given legacy engine sales limit. The excess NO_x ~~or~~ and PM emissions from these percentages of heavy-duty legacy engines exceeding the allowable legacy engine sales limits must be offset at 4 times the deficit balance. For example, if the deficit balance of the percentage above a given legacy engine sales limit is 1 Mg NO_x, the manufacturer would need to offset the deficit with 4 Mg NO_x. All legacy engine sales above the legacy engine sales limits in Option 2 plus the allowed percent sales exceedance will be considered non-compliant engine sales. For example, if at the end of 2024 model year, a manufacturer determines that it has sold 1,000 heavy-duty diesel engines in California of which 660 are medium heavy-duty diesel legacy engines and 150 are the combined light heavy-duty and heavy heavy-duty diesel legacy engines, then the manufacturer must offset the deficit from 600 medium heavy-duty diesel legacy engines and 150 light heavy-duty and heavy heavy-duty diesel engines at the normal rate plus the deficit from 50 medium heavy-duty diesel legacy engines (i.e., 1,000 engines x 5 percent) at 4 times the normal rate. The remaining 10 medium heavy-duty diesel legacy engines would be considered non-compliant.

(e) NOx and PM deficits generated by legacy engines are subject to the provisions of §86.004-15.A.(b)(5) of these test procedures.

(f) In order to certify legacy engines in a particular model year, a manufacturer must also certify one or more heavy-duty diesel engine families subject to the standards in title 13, CCR, Section 1956.8(a)(2)(C)1 in the same model year. For the 2024 model year, a manufacturer may certify legacy engine families prior to certifying at least one engine family subject to the standards in title 13, CCR, Section 1956.8(a)(2)(C)1. Failure to certify a 2024 model year engine family to the standards in title 13, CCR, Section 1956.8(a)(2)(C)1 will result in the revocation of all 2024 model year Executive Orders issued for legacy engine families under this provision ab initio.

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6. Heavy-Duty Diesel Engine Idling Requirements. Except as provided in subparagraph I.11.B.6.2, the requirements in this subparagraph apply to 2008 through 2023 model diesel engines used in heavy-duty vehicles over 14,000 pounds GVWR, and 2024 and subsequent model diesel engines used in medium-duty vehicles from 10,001 to 14,000 pounds GVWR or heavy-duty vehicles over 14,000 pounds GVWR. Manufacturers may meet the requirements of this subparagraph by either demonstrating compliance with the Engine Shutdown System requirements of subparagraph 6.1, below or the optional NOx Idling Emission Standard specified in subparagraph 6.3, below.

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6.3.1.1 In lieu of the engine shutdown system requirements specified in subsection 11.B.6.1 above, an engine manufacturer may elect to certify its new 2008 through 2023 model year heavy-duty diesel engines and 2024 through 2026 model heavy-duty diesel engines subject to the provisions specified in subparagraph 11.B.5.3.4 and 2024 through 2026 model year heavy-duty diesel engines subject to the provisions specified in subparagraph 11.B.5.3.5 above, to an optional NOx idling emission standard of 30 grams per hour.

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

A. Federal provisions.

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B. California provisions

1. For medium-duty diesel-cycle engines certified under title 13, CCR §1956.8(h):

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3. *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 diesel hybrid powertrain families, manufacturers may begin participating in the California NOx and particulate averaging, banking and trading program to show compliance with the full useful life emission standards in Section I.11 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.3.(j) 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 four 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.

* * * *

(i) Family Emission Limits (FELs) - The CA-ABT program for medium-duty and heavy-duty diesel engines and optionally certified diesel hybrid powertrain families has separate FELs for each of the following certification emissions test cycles: FTP, RMC and LLC for engine families (Vehicle-FTP, Vehicle-RMC and Vehicle-LLC cycles for optionally certified diesel hybrid powertrain families). The relationships between the respective FELs for these cycles and the maximum allowable FELs are as follows:

(1) FTP FELs – These FELs apply to the FTP cycle for engine families (Vehicle-FTP cycle for optionally certified diesel hybrid powertrain families) NOx and particulate matter emissions, and are selected by the manufacturer for each engine family or optionally certified diesel hybrid powertrain family. These FELs are used in the CA-ABT calculations as shown in subparagraph B.3.(g) of this section. Maximum FEL values (caps) for the FTP (Vehicle-FTP) cycle are as follows:

(A) For 2023 and previous model years, the maximum NOx and particulate matter FELs are specified in Section I.11 of these test procedures.

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(C) For 2026 model year, the maximum FTP NOx FEL value is 0.20

g/bhp-hr for legacy engines certified under title 13, CCR, Section 1956.8(a)(2)(C)3. For all other 2026 model year engines, the maximum FTP NOx FEL value is 0.100 g/bhp-hr.

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35. Labeling. [§86.xxx-35].

A. Federal Provisions.

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B. California provisions.

1. For 2004 and later model year heavy-duty diesel engines certified under the requirements of title 13, CCR, §1956.8(a)(3), the statement of compliance requirements of this subsection shall be repeated for each of the two fueling modes of operation. Appended to the statement for the lower emitting fueling mode of operation shall be the following sentence:

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

7. For 2024 through 2026 model year heavy-duty diesel engines rated at or above 525 bhp maximum power and certified to the provisions specified in 13 CCR section 1956.8(a)(2)(C)2, the label must contain the following statement: "This engine conforms to the 525 horsepower and above exemption specified in 13 CCR 1956.8(a)(2)(C)2 applicable to XXXX model year".

8. For 2024, 2025, and 2026 model year heavy-duty diesel engines certified to the provisions specified in 13 CCR section 1956.8(a)(2)(C)3, the label must contain the following statement: "This legacy engine is certified under the provisions of 13 CCR 1956.8(a)(2)(C)3 applicable to XXXX model year." In addition, the label for engines that are sold as new engines in California must also contain the following: "CA."

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