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California Environmental Protection Agency

AIR RESOURCES BOARD

DRAFT POTENTIAL

CALIFORNIA TEST PROCEDURES FOR TIER 5 OFF-ROAD COMPRESSION-IGNITION ENGINES AND MARINE COMPRESSION-IGNITION ENGINES BELOW 37 KILOWATTS

Adopted: [INSERT DATE OF ADOPTION]

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

Date of Release: February 5, 2026; DRAFT

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CALIFORNIA TEST PROCEDURES FOR TIER 5 OFF-ROAD COMPRESSION-IGNITION ENGINES AND MARINE COMPRESSION-IGNITION ENGINES BELOW 37 KW

The provisions of Parts 86, 1036, 1039, 1042, 1065, and 1068, Title 40, Code of Federal Regulations (CFR), as adopted or as last amended on the date set forth next to the Title 40 CFR section number and title listed below, and to the extent they pertain to exhaust emission standards and test procedures, are hereby incorporated by reference and adopted as the "California Test Procedures for Tier 5 Off-Road Compression-Ignition Engines and Marine Compression-Ignition Engines Below 37 Kilowatts," with the following exceptions and additions. If a Part, Subpart, or section of Title 40 CFR is incorporated into these test procedures, any and all references to the incorporated Part, Subpart, or section of Title 40 CFR mean the applicable Part, Subpart, or section of Title 40 CFR as modified by these test procedures.

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

Subpart A – General Requirements

1. **General Applicability**.

1.1 The provisions contained in these test procedures apply to off-road compression-ignition engines that are certified to the Tier 5 final emission standards in title 13, CCR, section 2423.1 and to the standards for marine compression-ignition engines with a power rating below 37 kW in title 13, CCR, section 2423.2.

1.2 The provisions contained in these test procedures apply to off-road compression-ignition engines that are certified to the Tier 5 interim emission standards in title 13, CCR, section 2423.1, except as noted.

1.3 An engine manufacturer that certifies off-road compression-ignition engines to the Tier 4 emission standards in title 13, CCR, section 2423 shall certify the engines in accordance with the "2011 and Later Test Procedures," as defined in and incorporated by reference in title 13, CCR, section 2421, subsection (a)(4)(B).

2. Any reference to "you" and "the manufacturer" in the incorporated sections of the CFR in Part II, Subpart B shall mean the California Air Resources Board. Any reference to "you" and "the manufacturer" in the incorporated sections of the CFR in Part II, Subparts A and C, and Parts III, IV, V, VI, and VII shall mean the engine manufacturer.

3. Any reference to vehicle sales throughout the United States shall mean vehicle sales in the United States and vehicle sales in California, and any reference to "U.S.-directed production volumes" shall mean "U.S.-directed production volumes and California-directed production volumes, unless stated otherwise."

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4. References to “off-road compression-ignition engines” or “nonroad compression-ignition engines” in Parts II and VI shall not include marine compression-ignition engines. References to “off-road compression-ignition engine families” or “nonroad compression-ignition engine families” in Parts II and VI shall not include marine compression-ignition engine families.

5. Regulations concerning U.S. EPA hearings, U.S. EPA inspections, specific language on the Certificate of Conformity, evaporative emissions, particulate and oxides of nitrogen averaging and test group standards applicable in such averaging, alternative useful life, selective enforcement audit, Certification Short Test, and heavy-duty engines and vehicles shall not be applicable to these procedures, except where specifically noted.

6. Provisions in the CFR that specify civil penalty amounts shall not be applicable to these procedures.

7. Regulations both herein and in Title 40, CFR, Parts 1036, 1039, 1042, 1065, and 1068 shall be applicable to alternative fuel engines and equipment, including dual-fuel, bi-fuel, and fuel-flexible engines and equipment, except where specifically noted otherwise.

8. References concerning “off-road on-board diagnostics (OR OBD)” requirements mean the applicable requirements in title 13, CCR, section 2422.

9. Wherever these test procedures require that “a manufacturer shall notify CARB in writing,” the specified information shall be sent to the Chief of the Emissions Certification and Compliance Division, or designee, at 4001 Iowa Avenue, Riverside, California, 92507.

10. **Electronic Submittal to CARB**

Unless otherwise specified in these test procedures, electronic submittals to CARB shall be in accordance with the requirements in Part I, Subpart A, section 10.1 or section 10.2, as applicable.

10.1 A manufacturer shall electronically submit all information that is required in Part II of these test procedures to CARB via email through xxxx@arb.ca.gov or online at: https://ww2.arb.ca.gov/manufacturer-run-off-road-in-use-testing-program.

10.2 Except as indicated in previous section 10.1, wherever these test procedures require that a manufacturer shall submit information to CARB, but does not specify that this information must be submitted “in writing” or wherever electronic submission is required, the specified information must be submitted via email through XXXX@arb.ca.gov.

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11. **Application for Certification**

11.1 For engines that are certified to the Tier 5 exhaust emission standards in title 13, CCR, section 2423.1, subsection (d), a manufacturer shall submit an Application for Certification in accordance with Part III: 40 CFR PART 1039, Subpart C, section 1039.205.

11.2 For marine compression-ignition engines with a power rating below 37 kW that are certified to the standards in title 13, CCR, section 2423.2, a manufacturer shall submit an Application for Certification in accordance with Part VII: 40 CFR PART 1042, Subpart C, section 1042.205.

Subpart B – Section Numbering; Construction.

1. The section numbering convention employed in these test procedures, in order of priority, is as follows: For Parts I, II, and VI, the section numbering convention is Part, Subpart, section 1.1.1.1. For Parts III, IV, V, and VII, the section numbering convention is Part (specifying the 40 CFR Part that's being incorporated), Subpart, CFR section number (§), section 1.1.1.1. For example, "Part III: 40 CFR PART 1039 – CONTROL OF EMISSIONS FROM NEW AND IN-USE OFF-ROAD COMPRESSION-IGNITION ENGINES" means "Part III of these test procedures, which incorporates 40 CFR PART 1039 – CONTROL OF EMISSIONS FROM NEW AND IN-USE OFF-ROAD COMPRESSION-IGNITION ENGINES." 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.

2. In cases where the entire CFR section is incorporated by reference with no modifications, the notation "[No change.]" is used. In cases where there are no changes to the CFR language but there are additional California requirements, the notation "[No change.]" is used and the additional California requirements are then noted in a separate subsection with the numbering convention set forth in Part I, Subpart B, section 1, above. For example, Part I, Subpart C, section 1 incorporates all of the definitions in CFR sections 1039.801, 1042.901, 1065.1001, and 1068.30 into these test procedures. Part I, Subpart C, section 2 establishes additional California definitions for terms that are not included in CFR sections 1039.801, 1042.901, 1065.1001, or 1068.30, but are applicable to these test procedures. In addition, Part I, Subpart C, section 2 redefines terms that are included in CFR sections 1039.801, 1042.901, 1065.1001, or 1068.30, if needed, to make the definitions applicable to California's regulatory requirements.

3. The notation "[n/a]" indicates that the subject matter of the federal regulation does not apply to California off-road compression-ignition engines. In some cases, the subject of the federal regulation is indicated in the bracket for clarity.

4. The notation “Delete” means that the section (including all subsections) does not apply. The notation “Delete; Replace with the following” means to delete the text of that section (and delete all subsections) and replace with language provided.

5. The notation “Amend as follows” means that the text set forth in these test procedures has been modified from the text that appears in the incorporated section of the CFR, as noted.

Subpart C – Definitions, Acronyms, and Abbreviations.

1. Definitions.

Unless otherwise noted in Part I, section B.2, the definitions in 40 CFR sections 1039.801, 1042.901, 1065.1001, and 1068.30, incorporated by reference below shall apply to these test procedures.

2. California Definitions.

“**Administrator**” means the Executive Officer of the California Air Resources Board (CARB).

"**Active 50 hour array**” is defined in title 13, CCR, section 2422.

“**Allowed procedures**” means procedures specified in title 13, CCR, section 2423, 2423.1, or 2423.2, as applicable.

“**Alternate procedures**” means procedures allowed under title 13, CCR, section 2423 or 2423.1, as applicable.

“**Alternative fuel engine or equipment**” means an engine or off-road equipment that is engineered and designed to operate on a fuel other than gasoline and diesel fuels, such as methanol, ethanol, and gaseous fuels. Alternative fuels include, but are not limited to: methanol, ethanol, liquefied petroleum gas, compressed natural gas, hydrogen, and electricity.

“**Applicable standard**” means an emission standard to which an engine is subject; or a family emission limit to which an engine is certified in title 13, CCR, section 2423, 2423.1, or 2423.2, as applicable.

“**ASTM E29-22**” means the “Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications,” as approved by ASTM International on April 2022, incorporated by reference, herein.

“**Attestation**” means a statement signed and dated by an individual, who is employed by a manufacturer and authorized to affirm the attested statement on behalf of the manufacturer, certifying under penalty of perjury under the laws of the State of California that the attested statement is true, accurate, and complete.

"Automatic Engine Shutdown" means a technology that automatically shuts down the engine after a predetermined period of idling, as specified in Part VI, Subpart C, section 2.

"**Auxiliary emission-control device**" means any element of design that senses temperature, motive speed, engine speed, transmission gear, or any other parameter for the purpose of activating, modulating, delaying, or deactivating the operation of any part of the emission-control system.

"Auxiliary Power Unit (APU)" has the definition in 40 CFR, Part 1037, section 1037.801 (April 22, 2024), incorporated by reference herein.

"**Bi-fuel engine or equipment**" is any engine or equipment that is engineered and designed to be capable of operating on two fuels wherein the two fuels are stored on board in separate fuel tanks and metered separately, but in operation the two fuels are combusted together.

"**California ABT program**" means the California Averaging, Banking, and Trading program in Part III: 40 CFR PART 1039, Subpart H of these test procedures.

"**Certificate of Conformity**" means Executive Order certifying engines or equipment for sale in California.

"**Certification**" means certification as defined in section 39018 of the California Health and Safety Code.

"**CISD-09-04 REVISED (HDDE)**" means U.S. EPA guidance letter, "Revised Guidance for Certification of Heavy-Duty Diesel Engines Using Selective Catalyst Reduction (SCR) Technologies," December 30, 2009, incorporated by reference herein.

"**Designated Compliance Officer**" means the Executive Officer of the California Air Resources Board or the Executive Officer's designee.

"**Dual-fuel engine or equipment**" means any engine or equipment that is engineered and designed to be capable of operating on gasoline or diesel and on compressed natural gas or liquefied petroleum gas, with separate fuel tanks for each fuel on-board the vehicle. In operation, only one fuel is used at a time.

"**EPA**" or "**U.S. EPA**" shall also mean the California Air Resources Board.

"**Executive Officer**" means the Executive Officer of the California Air Resources Board or the Executive Officer's designee.

"Federal ABT program" means the Averaging, Banking, and Trading program in 40 CFR, Part 1039, subpart H, which includes § 1039.701 (October 25, 2016), § 1039.705 (April 22, 2024), § 1039.710 (October 25, 2016), § 1039.715 (April 30,

2010), § 1039.720 (April 30, 2010), § 1039.725 (October 25, 2016), § 1039.730 (October 25, 2016), § 1039.735 (October 25, 2016), § 1039.740 (June 29, 2021), and § 1039.745 (June 29, 2004).

"**Greenhouse gas**" means the following gases: carbon dioxide, methane, nitrous oxide, and hydrofluorocarbons.

"**Hand-startable engine**" means an engine that is started using a hand crank or pull cord.

"**IACD-2025-09 (Marine CI)**" means U.S. EPA Guidance Letter "IACD-2025-09 (Marine CI)," SUBJECT: Reporting Exempt Replacement Engines Under 1042.615, dated July 21, 2025, incorporated by reference, herein.

"**IACD-2025-10**" means U.S. EPA Guidance Letter "IACD-2025-10," SUBJECT: Revised Guidance for Light Duty Vehicles, Heavy-Duty Diesel Engines and Nonroad Compression-Ignition (CI) Engines Using Selective Catalyst Reduction (SCR) Technologies, dated August 11, 2025, incorporated by reference, herein.

"**In-use compliance testing**" means emission testing of engines conducted under the "In-Use Vehicle Enforcement Test Procedures" in title 13, CCR, division 3, chapter 2, article 2.3.

"**ISO 22241**" means INTERNATIONAL STANDARD: ISO 22241-1, Second edition 2019-02: Diesel engines — NOx reduction agent AUS 32 —Part 1: Quality requirements, incorporated by reference, herein.

"**Manufacturers Advisory Correspondence**" means a document issued by CARB that provides policy interpretation for further clarification of a regulation, available at "1997 to Present Manufacturers Advisory Correspondence (MAC) - Mobile Source Emissions Certification Guidelines | California Air Resources Board."

"**Nonroad Compression-Ignition Composite Transient Cycle**" is defined in Part III: 40 CFR PART 1039, Appendix VI to Part 1039 – Nonroad Compression-Ignition Composite Transient Cycle of these test procedures.

"**Nonroad engine**" and "**Nonroad equipment**" means "off-road engine" and "off-road equipment," respectively, in California.

"**Not-to-Exceed**" **(NTE)** refers to the Not-To-Exceed test procedures in Part II, Subpart B, section 1 of these test procedures.

"**Off-Road Low-Load Cycle**" means the Off-Road Low-Load Test Cycle Driving Schedule in Part VI, Subpart B of these test procedures.

"**Off-Road On-Board Diagnostics (OR OBD)**" means the off-road on-board diagnostics regulation in title 13, CCR, section 2422.

"**Power category**" means a specific range of maximum engine power that defines the applicability of standards. For example, references to the 56-130 kW power category and 56 ≤ kW < 130 include all engines with maximum engine power at or above 56 kW but below 130 kW. Also references to 56-560 kW power categories or 56 ≤ kW ≤ 560 include all engines with maximum engine power at or above 56 kW but at or below 560 kW, even though these engines span multiple power categories. Note that in some cases, FEL caps are based on a subset of a power category. The power categories are defined as follows:

(1) Engines with maximum power below 8 kW.

(2) Engines with maximum power at or above 8 kW but below 19 kW.

(3) Engines with maximum power at or above 19 kW but below 56 kW.

(4) Engines with maximum power at or above 56 kW but below 130 kW.

(5) Engines with maximum power at or above 130 kW but at or below 560 kW.

(6) Engines with maximum power above 560 kW.

"Recall" means an inspection, repair, adjustment, or modification program initiated and conducted by a manufacturer or its agent or representative to remedy any nonconformity for which direct notification of equipment or engine owners shall be required. The California "Procedures for In-Use Vehicle Voluntary and Influenced Recalls" are in title 13, CCR, division 3, chapter 2, article 2.1. The California "Procedures for in-Use Vehicle Ordered Recalls" are in title 13, CCR, division 3, chapter 2, article 2.2.

"Recall testing" means in-use testing performed to assess whether or not a recall is needed.

"**SAE J2719**" means the "SAE International Technical Standard, Hydrogen Fuel Quality for Fuel Cell Vehicles, SAE Standard J2719_202003," Revised March 2020, Reaffirmed November 2015, Issued November 2005, incorporated by reference herein.

"**Safe location**" means a location where a piece of equipment that has been intentionally turned off can be temporarily parked as a precaution for human and equipment safety and that provides sufficient room for the piece of equipment to be safely operated to allow for proper maintenance and repairs without the risk of collision or interference with other work, structures, or machinery.

"**Small volume manufacturer**" means an engine manufacturer that meets the "California small-volume engine manufacturer" definition as set forth in title 13, CCR, section 2421.1.

"**Standard-setting part**" means title 13, CCR, section 2423, 2423.1, or 2423.2, as applicable.

"**Steady-State Duty Cycles**" are defined as follows:

(A) "Discrete-Mode Testing Duty Cycles" are contained in subparagraphs (a)(1), (b)(1), and (c)(1) of Appendix II to 40 CFR, Part 1039 of these test procedures.

(B) "Ramped Modal Testing Duty Cycles" (RMC) are contained in subparagraphs (a)(2), (b)(2), and (c)(2) of Appendix II to 40 CFR, Part 1039 of these test procedures.

"Stop-start technology" means a technology that automatically shuts down the engine after a predetermined period of idling, as specified by the engine manufacturer, and restarts it in response to operator demand.

"**Tier 4 engine**" means an engine that is certified to the Tier 4 interim or Tier 4 final emission standards in title 13, CCR, section 2423, subsection (b)(1)(B).

"**Tier 5 engine**" means an engine that is certified to the Tier 5 interim or Tier 5 final emission standards in title 13, CCR, section 2423.1.

"**Tier 5 final engine**" means an engine that is certified to the Tier 5 final emission standards in title 13, CCR, section 2423.1.

"Tier 5 interim engine" means an engine that is certified to the optional Tier 5 interim emission standards in title 13, CCR, section 2423.1.

"**Transportation refrigeration unit**" means "transport refrigeration unit," as defined in title 13, CCR, section 2477.4.

"**Useful life**" is defined in title 13, CCR, section 2421.1, subsection (b)(2) for Tier 5 engines and for marine compression-ignition engines with a power rating below 37 kW. "Useful life" is defined in title 13, CCR, section 2421, subsection (a)(60) for Tier 4 engines.

"**Vehicle**" means "piece of equipment."

"**We (us, our)**" means the Executive Officer of the California Air Resources Board and any authorized representatives.

3. Acronyms and Abbreviations.

"**2B-MAW**" means Two-Binned Moving Average Window.

"**40 CFR**" means Title 40, Code of Federal Regulations.

"**AECD**" means auxiliary emission-control device.

"**CA-ABT**" means the California Averaging, Banking, and Trading Program.

"**CARB**" means California Air Resources Board.

"**CCR**" means California Code of Regulations.

"**CFR**" means Code of Federal Regulations.

"**CO**" means carbon monoxide.

"**CO_2**" means carbon dioxide.

"**DEF**" means diesel exhaust fluid.

"**DPF**" means diesel particulate filter. A DPF is also called a "PM filter."

"**ECU**" means electronic control unit.

"**EGR**" means exhaust-gas recirculation.

"**FEL**" means family emission limit.

"**g/hr"** means grams per hour.

"**g/kW-hr**" means grams per kilowatt-hour.

"**HC**" means hydrocarbons.

"**kW**" means kilowatt.

"**MAW**" means Moving Average Window.

"**MIL**" means malfunction indicator light, as defined in title 13, CCR, section 2422.

"**n/a**" means not applicable.

"**NMHC**" means non-methane hydrocarbons.

"**NOx**" means oxides of nitrogen.

"**NRTC**" means Nonroad Compression-Ignition Composite Transient Cycle.

"**NTE**" means Not-to-Exceed.

"**ORIUC**" means CARB-Run Off-Road In-Use Compliance program.

"**ORIUT**" means Manufacturer-Run Off-Road In-Use Testing program.

"**OR-LLC**" means Off-Road Low-Load Cycle.

"**OR OBD**" means off-road on-board diagnostics system.

"**OR-REAL**" means Off-Road Real Emissions Assessment Logging, as described in title 13, CCR, section 2422.

“**PEMS**” means a portable emissions measurement system.

“**PM**” means particulate matter.

“**ppmw**” means parts per million by weight.

“**rpm**” means revolutions per minute.

“**SCR**” means selective catalytic reduction.

“**SOS**” means Sum over Sum.

“**STD**” means emission standard.

“**T4f FEL**” means “the Family Emission Limit to which an engine was certified to applicable Tier 4 final NOx emission standard”.

“**T5f STD**” means the applicable Tier 5 final NOx emission standard.

“**THC**” means total hydrocarbons.

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

Part II: IN-USE EMISSIONS COMPLIANCE

For off-road compression-ignition engine families in the 56 ≤ kW ≤ 560 power categories, Part II, Subparts A through C shall apply. For off-road compression-ignition engine families in power categories < 56 kW or > 560 kW and marine compression-ignition engine families in power categories < 37 kW, only Part II, Subpart B shall apply.

Subpart A – Manufacturer-Run Off-Road In-Use Testing (ORIUT) Program.

A manufacturer of engine families in the 56 ≤ kW ≤ 560 power categories shall comply with the following ORIUT program requirements in Part II, Subpart A. Engine families in power categories that are < 56 kW or > 560 kW are not subject to the ORIUT program requirements in Part II, Subpart A.

1. ECU and Sensor Data Screening.

1.1 General Provisions

1.1.1 Definitions of the terms “OR-REAL data,” “Active 50 Hour Array,” “Stored 50-Hour Array,” “Lifetime Array,” “Lifetime Engine Activity Array,” and “MIL-on fault code” and “OR OBD data snapshot” and applicable requirements for these terms are set forth in title 13, CCR, section 2422.

1.1.2 The tracking parameter and fault code specifications are subject to the OR OBD requirements in title 13, CCR, section 2422.

1.1.3 For small sales volume engine families, as defined in Part II, Subpart A, section 3.2.1.2, compliance with the screening requirements under Part II, Subpart A, section 1 is optional. However, manufacturers of small sales volume engines may be required to conduct in-use PEMS testing on these engine families in accordance with Part II, Subpart A, section 3.

1.1.4 For very small sales volume engine families, as defined in Part II, Subpart A, section 3.2.1.2, compliance with the requirements under Part II, Subpart A is optional.

1.2 NOx screening requirements

An engine manufacturer shall perform the following screening method using data from the OR OBD system to evaluate in-use NOx emissions from engine families within applicable power categories.

1.2.1 An engine manufacturer shall collect OR-REAL data, in accordance with title 13, CCR, section 2422, on 100 percent of its Tier 5 final engine families and on 100 percent of engines within each engine family. The engine manufacturer shall inform CARB in writing and provide a justification in the screening plan in accordance with Part II, Subpart A, section 1.7 when it submits

OR-REAL data in accordance with Part II, Subpart A, section 1.2.3 if it is unable to collect the required data from 100 percent of its Tier 5 final engines within an engine family based on the following conditions. CARB may approve the collection of data from less than 100 percent of engines if the engine manufacturer demonstrates that the data that has been collected is representative of the engine family.

1.2.1.1 Low-usage: This provision is applicable to engines installed in equipment operating fewer than 50 hours per calendar year within the state of California. Engine manufacturers shall report OR-REAL data for engines that qualify as “low-usage” as part of the reporting requirements in Part II, Subpart A, section 2.

1.2.1.2 Remote location of equipment: This provision applies to situations in which electronic transmission of data may not be feasible at all times, including the following situations. The engine manufacturer shall provide a list of engines and corresponding locations, as part of the reporting requirements in Part II, Subpart A, section 2, to demonstrate “remote location of equipment.”

1.2.1.2.1 No wireless connection: This provision applies to engines installed in equipment for which engine manufacturers face hardship in accessing OR-REAL data due to operating locations that do not have access to wireless connections.

1.2.1.2.2 No satellite connection: This provision applies to engines installed in equipment where cellular coverage is nonexistent, and access to commercial satellite communication is not viable.

1.2.1.3 Owner of equipment does not allow it: This provision applies to engines installed in equipment where the owner refuses consent for access due to data privacy concerns. The engine manufacturer shall provide a list of engine serial numbers for which equipment owners refuse access and attest that the list is complete and accurate.

1.2.1.4 Emergency equipment: This provision applies to engines installed in equipment that meets the definition of “emergency equipment” in Part III: 40 CFR PART 1039, Subpart I, section 1039.801.

1.2.2 NOx screening shall utilize the data stored in the OR-REAL 2-bin moving average window bins.

1.2.3 **Data Submission**

1.2.3.1 An engine manufacturer shall electronically submit all collected OR-REAL data, in accordance with title 13, CCR, section 2422. The

engine manufacturer shall submit all available data to CARB for at least 75 percent of engines per engine family that are certified and sold in California for each calendar year. The engine manufacturer shall submit all available data, even if there is data for more than 75 percent of its engines. This data shall be submitted by no later than April 30th of the calendar year following the end of the previous calendar year. An engine manufacturer shall notify CARB and receive approval to report less than 75 percent of engines from the engine family due to equipment meeting the conditions in Part II, Subpart A, section 1.2.1.

1.2.3.2 The engine manufacturer shall submit annual reports for engines that have reached 75 percent of their useful life at the end of the calendar year in which exceedance of the 75 percent of useful life occurs. For the engines that have reached 75 percent of useful life in the middle of the calendar year, only the data within 75 percent of useful life will be evaluated. “Useful life” is defined in title 13, CCR, section 2421.1, subsection (b)(2).

1.2.4 An engine family must pass both of the following NOx emission screening criteria and the PM screening criteria in Part II, Subpart A, sections 1.3 to be identified as a “clean engine family” under Part II, Subpart A, section 1.4.

1.2.4.1 **First Criterion**: The engine manufacturer shall calculate the arithmetic mean NOx emissions of each of the 2-bin moving average window bins A and B, as defined in title 13, CCR, section 2422, subsection (e)(2)(D)1.d, for both the Stored 50-Hour Array and the Lifetime Array for the engine family. If the arithmetic average NOx emissions of the engine family are at or below 1.5 times the applicable standard plus the sensor accuracy margin, as calculated in accordance with the following table, the engine family shall pass the first criterion.

NOx Emission Screening Thresholds for First Criterion

2-Bin Moving Average Window Bins[3]	Normalized CO_2 emission mass ($m_{CO2,\ norm}$)	NOx Emission Screening Threshold
Bin A: Idle	$m_{CO2,\ norm} \leq 8.0\%$	1.5 x Idle Standard[1] + $m_{Sensor\ Accuracy}$[2]
Bin B: Non-idle	$8.0\% < m_{CO2,\ norm}$	1.5 x (0.75 x NRTC standard[4] + 0.25 x OR-LLC standard[5]) g/kW-hr + $m_{Sensor\ Accuracy}$[2]

[1] Idle NOx Standards for 56 ≤ kW < 130 is 5.0 g/hr or 0.0769 g/kW-hr * Power, whichever is greater, and for 130 ≤ kW < 560 is 10.0 g/hr or 0.0282 g/kW-hr * Power, whichever is greater. The Power corresponds to the emission-data engine's declared maximum power for the engine family in kW. If a NOx FEL is declared for the engine family, the FEL scaling calculation from title 13, CCR, section 2423.1, subsection (d)(1)(B)4 shall be applied to the idle standard.

[2] The sensor accuracy margin ($m_{Sensor\ Accuracy}$) is 0.2 g/hr for Bin A and 0.036 g/kW-hr for Bin B. If a NOx FEL is declared for the engine family, do not apply the FEL scaling calculation from title 13, CCR, section 2423.1, subsection (d)(1)(B)4 to the sensor accuracy margin.

[3] The 2-bin moving average window bins are defined in title 13, CCR, section 2422, subsection (e)(2)(D)1.d.

[4] NRTC standard = Applicable Tier 5 final standard in title 13, CCR, section 2423.1, subsection (d)(1)(A). For constant speed engines, replace the NRTC standard with the standard for the applicable steady-state duty cycle defined in title 13, CCR, section 2421.1, subsection (b). If a NOx FEL is declared for the engine family, the FEL shall replace the NRTC standard.

[5] OR-LLC standard = Applicable low-load cycle emission standard in title 13, CCR, section 2423.1, subsection (d)(2)(A). For constant speed engines, replace the OR-LLC standard with 1.5 times the standard for the applicable steady-state duty cycle defined in title 13, CCR, section 2421.1, subsection (b). If a NOx FEL is declared for the engine family, the FEL scaling calculation from title 13, CCR, section 2423.1, subsection (d)(1)(B)4 shall be applied to the OR-LLC standard.

1.2.4.2 **Second Criterion**: The engine manufacturer shall calculate the number of engines of the engine family for which data is not reported to CARB, except those exempted in Part II, Subpart A, sections 1.2.1.1, 1.2.1.2, 1.2.1.3, and 1.2.1.4, plus the number of engines with NOx emissions exceeding 2 times the applicable standard plus the sensor accuracy margin,

as calculated in accordance with the following table, for any of the 2-bin moving average window bins A and B as defined in title 13, CCR, section 2422, subsection (e)(2)(D)1.d, for either the Stored 50-Hour Array or the Lifetime Array. If the combined number of engines of the engine family is less than or equal to 25 percent of total California sales, the engine family passes the second criterion.

NOx Emission Screening Thresholds for Second Criterion

2-Bin Moving Average Window Bins[3]	**Normalized CO_2 emission mass ($m_{CO2,\ norm}$)**	**NOx Emission Screening Threshold**
Bin A: Idle	$m_{CO2,norm,} \leq 8.0\%$	2.0 x Idle Standard[1] + $m_{Sensor\ Accuracy}$[2]
Bin B: Non-idle	$8.0\% < m_{CO2,norm}$	2.0 x (0.75 x NRTC standard[4] + 0.25 x OR-LLC standard[5]) g/kW-hr + $m_{Sensor\ Accuracy}$[2]

[1] Idle NOx Standard for 56 ≤ kW < 130 is 5.0 g/hr or 0.0769 g/kW-hr * Power, whichever is greater, and for 130 ≤ kW < 560 is 10.0 g/hr or 0.0282 g/kW-hr * Power, whichever is greater. The Power corresponds to the emission-data engine's declared maximum power for the engine family in kW. If a NOx FEL is declared for the engine family, the FEL scaling calculation from title 13, CCR, section 2423.1, subsection (d)(1)(B)4 shall be applied to the idle standard.

[2] The sensor accuracy margin ($m_{Sensor\ Accuracy}$) is 0.2 g/hr for Bin A and 0.036 g/kW-hr for Bin B. If a NOx FEL is declared for the engine family, do not apply the FEL scaling calculation from title 13, CCR, section 2423.1, subsection (d)(1)(B)4 to the sensor accuracy margin.

[3] The 2-Bin moving average window bins are defined in title 13, CCR, section 2422, subsection (e)(2)(D)1.d.

[4] NRTC standard = Applicable Tier 5 final standard in title 13, CCR, section 2423.1, subsection (d)(1)(A). For constant speed engines, replace the NRTC standard with the standard for applicable steady-state duty cycle defined in title 13, CCR, section 2421.1, subsection (b). If a NOx FEL is declared for the engine family, the FEL shall replace the NRTC standard.

[5] OR-LLC standard = Applicable low-load cycle emission standard in title 13, CCR, section 2423.1, subsection (d)(2)(A). For constant speed engines, replace the OR-LLC standard with 1.5 times the standard for applicable steady-state duty cycle defined in title 13, CCR, section 2421.1, subsection (b). If a NOx FEL is declared for the engine family, the FEL scaling calculation from title 13, CCR, section 2423.1, subsection (d)(1)(B)4 shall be applied to the OR-LLC standard.

1.2.5 Requirements for Engine Families that do not Pass the First Criterion, the Second Criterion, or Both Criteria

1.2.5.1 CARB shall require PEMS testing for all criteria pollutants in accordance with the selection criteria in Part II, Subpart A, section 3 on any engine family that does not pass the first criterion, the second criterion, or

both criteria to verify emissions control. An engine manufacturer shall conduct PEMS testing in accordance with Part II, Subpart A, section 3 if an engine family does not meet the first criterion, the second criterion, or both criteria in Part II, Subpart A, section 1.2.4.

1.2.5.2 An engine manufacturer may voluntarily recall, in accordance with title 13, CCR, sections 2113.1 and 2114.1, any engine family that does not pass the first criterion, the second criterion, or both criteria as an alternative to performing PEMS testing on that engine family, as required by Part II, Subpart A, section 1.2.5.1.

1.3 **PM screening requirements**

A manufacturer shall perform the following screening method using data from the OR OBD system to indicate potentially high in-use PM emissions for engine families within applicable power categories.

1.3.1 An engine manufacturer shall collect PM filter fault code history data, in accordance with title 13, CCR, section 2422, on 100 percent of its Tier 5 final engine families that are certified and delivered for sale in California. CARB may approve collection of less than 100 percent of a manufacturer's Tier 5 final engine families if any of the conditions in Part II, Subpart A, section 1.2.1 are met.

1.3.2 An engine manufacturer shall electronically submit all collected data, as specified in section 1.3.2.1 and section 1.3.2.2, for each engine. The engine manufacturer shall submit all available data to CARB for at least 75 percent of engines per engine family that are certified and sold in California for each calendar year. The engine manufacturer shall submit all available data, even if there is data for more than 75 percent of its engines. This data shall be submitted by no later than April 30th of the calendar year following the end of the previous calendar year. An engine manufacturer shall notify CARB and receive approval to report less than 75 percent of engines from the engine family due to equipment meeting the conditions in Part II, Subpart A, section 1.2.1.

1.3.2.1 PM filter fault code history data in accordance with the OR OBD requirements in title 13, CCR, section 2422, subsection (e)(3)(F)1.

1.3.2.2 Total engine run time in accordance with title 13, CCR, section 2422, subsection (e)(2)(D)2 at the time the PM filter fault code history data was obtained.

1.3.3 The submission of annual reports for engines that have reached 75 percent of their useful life at the end of the calendar year is required. For the engines that have reached 75 percent of useful life in the middle of the calendar

year, only the data within 75 percent of useful life will be evaluated. “Useful life” is defined in title 13, CCR, section 2421.1, subsection (b)(2).

1.3.4 To comply with the PM screening criteria portion of the In-Use Testing Requirements, an engine family shall meet the requirements in Part II, Subpart A, section 1.3.6.

1.3.5 Engine manufacturers shall conduct PEMS testing for all criteria pollutants in accordance with Part II, Subpart A, section 3 if an engine family does not meet the PM screening criteria.

1.3.6 **PM screening criteria**

PM screening for an engine family is assessed by evaluating the engine family's sales volume and its corresponding PM filter fault code history, including both PM filtration efficiency malfunctions and PM sensor malfunctions.

1.3.6.1 For engine families exceeding a sales volume of 200 engine units, compliance with PM screening requirements is achieved if the number of engines with PM filter-related fault codes within the last 3,000 hours of engine operation equals or is less than 5 percent of the total sales within the engine family.

1.3.6.2 For engine families exceeding a sales volume of 50 but not surpassing 200 engine units, compliance with PM screening requirements is achieved if the number of engines with PM filter-related fault codes within the last 3,000 hours of engine operation equals or is less than 5 percent of the total sales within the engine family or 8 engines, whichever is greater.

1.3.6.3 For engine families with a sales volume fewer than 50 engine units, compliance with PM screening requirements is achieved if the number of engines with PM filter-related fault codes within the last 3,000 hours of engine operation equals or is less than 5 percent of the total sales within the engine family or 2 engines, whichever is greater.

1.4 Once CARB confirms that the data submitted by the engine manufacturer shows that an engine family meets both the NOx and PM screening criteria in Part II, Subpart A, sections 1.2 and 1.3, respectively, the engine family may be identified as a “clean engine family,” and shall fulfill the manufacturer-run in-use testing requirements, and PEMS testing shall not be required under Part II, Subpart A, section 3.

1.5 Special Cases for NOx and PM Screening

1.5.1 If the conditions in Part II, Subpart A, section 1.5.1.1 or section 1.5.1.2 are met, CARB shall notify the engine manufacturer and direct the engine manufacturer to perform the steps in Part II, Subpart A, section 1.5.2.

1.5.1.1 80 percent or more of reported engines within an engine family fail the first NOx screening criteria Part II, Subpart A, section 1.2.4 or the PM screening criteria in Part II, Subpart A, section 1.3.6, or

1.5.1.2 NOx emissions from more than 25 percent of the engines within an engine family are 10 times higher than the applicable NOx Emission Screening Threshold in any of the 2-bin moving average window bins in Part II, Subpart A, section 1.2.4.

1.5.2 Investigation of the Cause of High Emissions

1.5.2.1 Within 30 days from when the engine manufacturer is notified by CARB, the engine manufacturer shall begin discussion on the results from section 1.5.2 with CARB to investigate the cause of high emissions. Concurrently, CARB may request additional PEMS testing without counting it as part of the selected engine families required under Part II, Subpart A, section 3.2.1.

1.5.2.2 The engine manufacturer shall investigate and report if engines or equipment have incorrect, improperly installed, or otherwise defective emission-related components or systems in accordance with Part V: 40 CFR PART 1068, Subpart F, section 1068.501.

1.5.2.3 If a defect or noncompliance is confirmed, the manufacturer shall perform corrective action under Part II, Subpart A, section 4.

1.5.3 If data is missing or not reported for more than 50 percent of the engines tested within a particular engine family, the following shall occur.

1.5.3.1 The manufacturer shall submit an attestation to explain the missing data based on the criteria in Part II, Subpart A, section 1.2.1, which may allow the submission of data from fewer than 75 percent of the engines within an engine family.

1.5.3.2 If a manufacturer is unable to demonstrate that the missing or unreported data meet the criteria in Part II, Subpart A, section 1.2.1, CARB may require PEMS testing for the applicable engine family in addition to the 25 percent of the Tier 5 engine families required under Part II, Subpart A, section 3.2.

1.5.3.3 An engine manufacturer shall develop a plan to improve data collection that the engine manufacturer shall submit to CARB for approval. The plan shall improve data collection by a minimum of 10 percent. The engine manufacturer shall notify CARB if it cannot improve data collection by 10 percent with justification. An engine manufacturer may be subject to civil penalties under the requirements of the California Health and Safety Code, Division 26, and corresponding regulations, if it does not comply with the 50 percent reporting requirements.

1.6 Data Collection and Submission

1.6.1 General Provisions

1.6.1.1 An engine manufacturer shall select either telematics or a manual collection approach to collect the data required under the Manufacturer-Run ORIUT program provisions in Part II, Subpart A, section 2.

1.6.1.2 If an engine manufacturer selects telematics to comply with Part II, Subpart A, section 1.6, the engine manufacturer or its telematics vendors shall pre-program each telematics device to automatically collect data from the engine's OR OBD system and remotely transmit the data to the engine manufacturer’s database at least annually without any further human intervention.

1.6.1.3 An engine manufacturer that chooses not to use telematics to comply with Part II, Subpart A, section 1.6 shall submit a request and seek approval for use of an alternative approach from CARB. The request shall include a plan, in accordance with Part II, Subpart A, section 1.7, to show how the manufacturer will collect data and an attestation from the manufacturer that they will follow the plan.

1.6.1.4 CARB shall review the request and supporting documentation to determine whether the alternative approach meets the NOx screening requirements in Part II, Subpart A, section 1.2 and the PM screening requirements in Part II, Subpart A, section 1.3. If CARB determines the request for an alternative approach meets the NOx and PM screening requirements, the request shall be approved.

1.6.2 Telematics Collection Requirements

1.6.2.1 The telematics device shall remain continuously connected to the engine’s OR OBD system.

1.6.2.2 The telematics device shall be capable of properly connecting to and communicating with the engine's OR OBD system, as well as collecting the required data as specified in Part II, Subpart A, section 2.

1.6.2.3 The telematics device shall not interfere with the normal operation of the engine's OR OBD system.

1.6.2.4 The telematics device shall support the OR OBD communication protocols specified in title 13, CCR, section 2422.

1.6.2.5 The telematics device shall be functional in off-road engine working conditions for the equipment in which the engine is installed, the applicable power category of the engine, and the duty-cycle of the engine, and thus it shall be resistant to shock, vibration, moisture, and environmental exposure.

1.6.2.6 The telematics device shall be tamper-resistant to make sure no alteration or erasure can be made on the data collected.

1.6.2.7 The engine manufacturer shall ensure proper and functioning communication between the telematics device and the engine manufacturer's database. (i.e., The engine manufacturer shall ensure the full capability of receiving and transmitting the signal and the completeness of the transmitted data).

1.6.3 Submitting the Collected Data to CARB

1.6.3.1 An engine manufacturer shall electronically submit an annual report to CARB by April 30th of the year following the end of the previous applicable calendar year.

1.6.3.2 The annual report shall contain both the OR-REAL data and the other data in the OR OBD data snapshot specified in title 13, CCR, section 2422.

1.6.3.3 The data shall not be omitted, altered, or tampered with during or prior to annual report preparation.

1.7 Screening Plan

1.7.1 The purpose of the screening plan is to ensure that the engine manufacturer has developed a reasonable, well thought out plan to collect the OR-REAL data required for the NOx and PM screening program and to inform CARB of that plan.

1.7.2 An engine manufacturer shall annually submit a screening plan for ECU and Sensor Data screening to CARB for review and approval. This plan shall be submitted electronically by June 1st of the applicable calendar year.

1.7.3 The screening plan shall include all of the following:

1.7.3.1 The number of engines to be estimated to be sampled, which shall be the total number of engines from each engine family, and associated engine serial numbers.

1.7.3.2 An estimate of the number of engines that may be exempt from reporting under Part II, Subpart A, sections 1.2.1.1 through 1.2.1.4 and explanation of the unreported data.

1.7.3.3 A list of engine families that are produced and delivered for sale in California and type of equipment in which an engine is used.

1.7.3.4 Estimate of type of data collection (i.e., telematics or manual collection) used for each engine in each engine family.

1.7.3.5 Attestation that the information provided is truthful, accurate and complete.

1.7.4 An engine manufacturer may request an extension from CARB by June 1st of the applicable calendar year of the deadline for data submission by up to 6 months. Along with this request, the manufacturer shall submit an interim report on all data collected within the previous 12 months.

1.7.5 CARB shall evaluate the request based on factors such as number of engines for which data was collected and time period over which the manufacturer attempted data collection to determine if the manufacturer has made a good faith effort to comply with the requirements of Part II, Subpart A, section 1. Based on that evaluation, CARB may extend the deadline for data submission tup to 6 months.

2. Reporting Requirements for ECU and Sensor Data Screening.

2.1 An engine manufacturer shall electronically submit an annual report of all OR-REAL data and the other data in the OR OBD data snapshot for each engine, along with a summary report by April 30th of the year following the end of the previous calendar year. These reports shall include information required in Part II, Subpart A, section 1 as specified in sections 2.1.1 through 2.1.6. All required information shall be submitted in a tabular format (i.e., comma-separated values file or Excel spreadsheets).

2.1.1 The following OR-REAL data shall be submitted for each engine.

2.1.1.1 All data collected in accordance with the requirements in title 13, CCR, section 2422, subsection (e)(2)(D); and

2.1.1.2 PM filter fault code history data recorded and counted by PM fault code tracker in accordance with title 13, CCR, section 2422, subsection (e)(3)(F)1.

2.1.1.2.1 A tracking parameter on each engine shall retain the five most recent fault codes, each with an engine-hour timestamp.

2.1.1.2.2 The total number of engines for which the OR OBD system has identified a malfunction of the PM filter. Engines to be included in the reported total include engines with a “pending fault code” and engines with an illuminated malfunction indicator light (“MIL-on”) for the PM filter.

2.1.2 Calculations using data collected for the 2-bin moving average window bins A and B that compare emissions from each engine to the thresholds in Part II, Subpart A, sections 1.2.4.1 and 1.2.4.2;

2.1.3 OR OBD data snapshot for each engine as specified in the OR OBD regulation in title 13, CCR, section 2422 taken in the calendar year immediately prior to the annual report;

2.1.4 For each applicable calendar year: the number of engines produced for California, the number of engines produced and delivered for sale in California, and the number of engines reporting valid data;

2.1.5 The average NOx emissions of the 2-bin moving average window bins for the Stored 50-Hour Array and Lifetime Array; and

2.1.6 The number of engines with NOx emissions higher than any of the NOx Emission Screening Thresholds for each of the 2-bin moving average window bins in Part II, Subpart A, section 1.2.4 for either the Stored 50-Hour Array or the Lifetime Array.

2.2 The annual report shall include:

2.2.1 Attestation by the engine manufacturer that the information provided is complete and accurate;

2.2.2 Determination of whether each engine family is exempted or not from PEMS testing;

2.2.3 Justification of data for each engine that is not collected or data for each engine that is not reported to CARB, such as low usage, remote location, sensor malfunction; and

2.2.4 Attestation by the engine manufacturer that no data has been purposefully excluded or altered from the report (e.g., the reported data does not

exclude data from engines with the highest in-use emissions or include only specific data from engines with the lowest in-use emissions).

2.3 Unless CARB has approved an engine manufacturer to collect less than 100 percent, an engine manufacturer that collects less than 75 percent of its OR-REAL data for Tier 5 final engines within each engine family may be subject to civil penalties under the requirements of the California Health and Safety Code, Division 26, and corresponding regulations.

3. In-Use Off-cycle testing with PEMS.

3.1 **§ 1036.401 Testing requirements for in-use engines.** January 24, 2023.

3.1.1 Delete subparagraph (a). Replace with the following: CARB may perform in-use testing of any engine family subject to the standards of this part, consistent with the Clean Air Act and the provisions of Part III: 40 CFR PART 1039, Subpart C, section 1039.235.

3.1.2 Delete subparagraph (b). Replace with the following: This subpart describes ORIUT program that applies to engines subject to compression-ignition standards under title 13, CCR, section 2423.1.

3.1.3 Subparagraph (c): [n/a]

3.1.4 Subparagraph (d). [No change.]

3.2 **§ 1036.405 Overview of the manufacturer-run field-testing program.** April 22, 2024.

3.2.1 Subparagraph (a): Amend as follows:

3.2.1.1 Delete introductory paragraph. Replace with the following: An engine manufacturer shall test in-use engines from the families selected by CARB. CARB may select the following number of engine families for testing, except as specified in paragraph (b) of this section:

3.2.1.2 Delete subparagraph (1). Replace with the following: The maximum number of engine families in a test order CARB may issue in any calendar year is equal to 25 percent of the number of large sales volume engine families in California annually, calculated by dividing the number of large sales volume engine families that a manufacturer produces and delivers for sale in California annually, as defined in the following table, by four and rounding to the nearest whole number in accordance with the rounding conventions in Part IV: 40 CFR PART 1065, Subpart A, section 1065.20. In any calendar year, CARB may select a combination of large and small sales volume engine families to test, provided the total number of engine families

selected does not exceed 25 percent of the number of large sales volume engine manufacturers produced and delivered for sale in California. If an engine manufacturer has only three or fewer large sales volume families, CARB may select one engine family per calendar year for testing. If an engine manufacturer has no large sales volume family, CARB may select one small sales volume engine family per calendar year for testing. For example, if a manufacturer has six engine families with large annual sales volumes, eight with small annual sales volumes, and five with very small annual sales volumes, CARB may issue a test order for two large engine families, or one large and one small engine families, or any other combination provided that the total number of engine families tested should not exceed two.

Testing Requirements Based on Manufacturer's California Sales

Tier 5 Power Category	Large California Sales Volume	Small California Sales Volume	Very Small California Sales Volume
56≤kW<130	>45	10 ≤ sales ≤ 45	<10
130≤kW≤560	>22	5 ≤ sales ≤ 22	<5

3.2.1.3 Subparagraph (2): [No change.]

3.2.1.4 Delete subparagraph (3). Replace with the following: CARB shall not select an engine family for testing under this subpart from a given model year if the engine family is determined to be a very small sales volume engine family, as defined in Part II, Subpart A, section 3.2.1.2.

3.2.2 Subparagraph (b): [No change.]

3.2.3 Delete subparagraph (c). Replace with the following: CARB may select any individual engine family for testing, regardless of its production volume except as described in paragraph (a)(3) of this section, as long as we do not select more than the number of engine families described in paragraph (a) of this section.

3.2.4 Subparagraphs (d) through (f): [No change.]

3.2.5 **California Provisions**

3.2.3.1 CARB shall evaluate engine family emissions from NOx and PM sensor data screening to determine if the engine family passes the NOx and PM screening criteria in Part II, Subpart A, sections 1.2.4 and 1.3.6, respectively.

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

3.2.3.2 CARB shall request additional PEMS testing without counting it as part of the selected engine families required under Part II, Subpart A, section 3.2.1 if one or more of the criteria in Part II, Subpart A, section 1.5.1 is met.

3.2.3.3 An engine family that passes the screening criteria in Part II, Subpart A, sections 1.2 and 1.3 shall not be selected for PEMS testing by CARB under Part II, Subpart A, section 3.

3.3 **§ 1036.410 Selecting and screening vehicles and engines for testing.** January 24, 2023.

3.3.1 Subparagraph (a): [No change.]

3.3.2 Subparagraph (b): Amend as follows:

3.3.2.1 Introductory sentence: [No change.]

3.3.2.2 Subparagraph (1): [No change.]

3.3.2.3 Subparagraph (2): [No change, except that the reference to "§ 1036.125" shall mean "Part III: 40 CFR PART 1039, Subpart B, section 1039.125 of these test procedures."]

3.3.2.4 Subparagraphs (3) through (5): [No change.]

3.3.2.5 Delete subparagraph (6). Replace with the following: The engines have not exceeded 75 percent of the applicable useful life, hours or years; an engine manufacturer may otherwise not exclude engines from testing based on their age or hours of operation.

3.3.2.6 Subparagraph (7): [No change.]

3.3.3 Delete subparagraph (c). Replace with the following: An engine manufacturer shall notify CARB before disqualifying any vehicle based on illuminated MIL or stored OR OBD trouble codes as described in title 13, CCR, section 2422, or for any other reasons not specified in subparagraph (b) of this section. For example, an engine manufacturer shall notify CARB if the engine manufacturer disqualifies any vehicle because the engine does not represent the engine family or the vehicle's usage is atypical for the particular application. An engine manufacturer does not need to notify CARB in advance if the owner declines to participate in the test program.

3.4 **§ 1036.415 Preparing and testing engines.** April 22, 2024.

3.4.1 Subparagraph (a): [No change, except that the reference to "§ 1036.115(f)" shall mean "Part V: 40 CFR PART 1068, Subpart A, section 1068.50 of these test procedures."]

3.4.2 Subparagraph (b): [No change.]

3.4.3 Subparagraph (c): Amend as follows:

3.4.3.1 Introductory sentence: [No change.]

3.4.3.2 Subparagraph (1): [No change, except add the following: An engine manufacturer may use any commercially available biodiesel fuel blend up to 20 percent biodiesel content (B20) that meets the specifications listed in title 4, CCR, section 4148.]

3.4.3.3 Subparagraph (2) through (5): [No change, except that the reference to "§ 1036.430" shall mean "Part II, Subpart A, section 3.7.1 of these test procedures."]

3.4.4 Subparagraph (d): Amend as follows:

3.4.4.1 Delete introductory paragraph. Replace with the following: An engine manufacturer shall test the selected engines using the test procedure described in Part II, Subpart C while the engines remain installed in the vehicle. Testing consists of characterizing emission rates for moving average 300 second windows while operating, with those windows divided into bins representing different types of engine operation over a shift-day. Measure emissions as follows:

3.4.4.2 Subparagraphs (1) and (2): [No change, except that "HC" shall mean "NMHC.", the reference to "§ 1036.115(a)" shall mean "1039.115(a)" and the reference to "§ 1036.240(e)" shall mean "1039.240(e)"]

3.4.5 Delete subparagraph (e). Replace with the following: The engine manufacturer shall operate the piece of equipment to be tested under conditions reasonably expected during normal operation. For the purposes of this subpart, normal operation generally includes the equipment's normal operating conditions and loads (including auxiliary loads such as air conditioning in the cab), normal ambient conditions, and the normal equipment operator, if applicable.

3.4.6 Delete subparagraph (f). Replace with the following: Once an engine is set up for testing, the engine manufacturer shall test the engine for one shift-day, except as allowed in Part II, Subpart A, sections 3.5.1.5. To complete a shift-day's worth of testing, the engine manufacturer shall start sampling at the beginning of a shift and continue sampling for the whole shift, subject to the calibration requirements of the PEMS. A shift-day is the period of a normal workday for an individual employee. The engine manufacturer shall evaluate the emission data as described in Part II, Subpart A, section 3.5 and include the data in the reporting and record keeping requirements specified in Part II, Subpart A, sections 3.7 and 3.8.

3.4.7 Delete subparagraph (g). Replace with the following: For engines certifying to title 13, CCR, section 2423.1, stop-start and automatic engine shutdown systems shall be overridden if they are adjustable. If those systems are not adjustable, set the 1-Hz emission rate to zero for all regulated pollutants when the idle-reduction feature is active. Do not exclude these data points under Part II, Subpart C, section 3.1.3.3.2. Note that systems are considered ‘‘adjustable’’ if equipment owners, dealers, or other service outlets can override the idle-reduction features.

3.5 **Engine Pass Criteria**

3.5.1 **§ 1036.420 Pass Criteria for individual engines.** April 22, 2024.

3.5.1.1 Delete introductory paragraph. Replace with the following: An engine’s pass or fail determination is based on a comparison of each bin’s Sum-over-Sum (SOS) criteria pollutant emission for each of the two bins, A and B, to the SOS Emissions In-Use Thresholds specified in Part II, Subpart A, section 3.5.1.2.

3.5.1.2 Delete subparagraph (a). Replace with the following: The SOS Emissions In-Use Thresholds for PEMS testing for each pollutant in each bin shall be calculated in accordance with the following table.

PEMS In-Use Bin	**Normalized CO_2 emission mass over the 300 second test interval**	**SOS Emissions In-Use Threshold**
PEMS Bin A: Idle	$m_{CO2,norm,testinterval} \leq 8.0\%$	1.5 x Idle standard + $m_{PEMS\ Accuracy\ Margin}$ + $m_{low\ amb}$
PEMS Bin B: Non-idle	$8.0\% < m_{CO2,norm,testinterval}$	1.5 x (0.75 x NRTC standard + 0.25 x OR-LLC standard) + $m_{PEMS\ Accuracy\ Margin}$ + $m_{low\ amb}$

Where:

Idle standard = Idle NOx Standards for 56 ≤ kW < 130 is 5.0 g/hr or 0.0769 g/kW-hr * Power, whichever is greater, and for 130 ≤ kW ≤ 560 is 10.0 g/hr or 0.0282 g/kW-hr * Power, whichever is greater. The Power corresponds to the emission-data engine's declared maximum power for the engine family in kW.

NRTC standard = Applicable Tier 5 final standard in title 13, CCR, section 2423.1, subsection (d)(1)(A). For constant speed engines, replace the NRTC standard with the standard for applicable steady-state duty cycle defined in

title 13, CCR, section 2421.1, subsection (b). If a NOx or PM FEL is declared for the engine family, the FEL shall replace the NRTC standard.

OR-LLC standard = Applicable low-load cycle emission standard in title 13, CCR, section 2423.1, subsection (d)(2)(A). For constant speed engines, replace the OR-LLC standard with 1.5 times the standard for applicable steady-state duty cycle defined in title 13, CCR, section 2421.1, subsection (b). If a NOx FEL is declared for the engine family, the FEL scaling calculation from title 13, CCR, section 2423.1, subsection (d)(1)(B)4 shall be applied to the OR-LLC standard.

$m_{low\ amb}$ = Applicable low ambient temperature correction factors for NOx in the following table. T_{amb} is the mean ambient temperature over a shift-day, or equivalent. Adjust the off-cycle NOx standard for T_{amb} below 20.0 °C by adding the calculated temperature adjustment to the specified NOx standard. Round the temperature adjustment to the same precision as the NOx standard for the appropriate bin. If a NOx FEL is declared for the engine family, do not apply the FEL scaling calculation from title 13, CCR, section 2423.1, subsection (d)(1)(B)4 to the calculated temperature adjustment.

PEMS In-Use Bin	$m_{low\ amb}$	Unit
PEMS Bin A	$(20.0-T_{amb}) \times 0.122$	g/hr
PEMS Bin B	$(20.0-T_{amb}) \times 0.00288$	g/kW-hr

$m_{PEMS\ Accuracy\ Margin}$ = Applicable accuracy margins in the following table. If a NOx or PM FEL is declared for the engine family, do not apply the FEL scaling calculation from title 13, CCR, section 2423.1, subsection (d)(1)(B)4 to the PEMS accuracy margin.

Applicable $m_{PEMS\ Accuracy\ Margins}$ by Pollutant

PEMS In-Use Bin	NOx	PM	NMHC	CO
PEMS Bin A	0.4 g/hr	n/a	n/a	n/a
PEMS Bin B	0.007 g/kW-hr	0.008 g/kW-hr	0.013 g/kW-hr	0.034 g/kW-hr

3.5.1.3 Subparagraph (b): [No change.]

3.5.1.4 Delete subparagraph (c). Replace with the following: For engines subject to the off-road compression-ignition engine standards in title

13, CCR, section 2423.1, the engine manufacturer shall determine the number of windows in each bin. A bin is valid under this section only if it has at least 2,400 windows for Bin A and 10,000 windows for Bin B.

3.5.1.5 Delete subparagraph (d). Replace with the following: Continue testing as necessary to achieve the minimum window requirements for each bin, as specified in subsection 3.5.2 of this section.

3.5.1.6 Delete subparagraph (e). Replace with the following: An engine shall pass in-use testing if the SOS emissions for each pollutant in each bin are at or below the applicable SOS Emissions In-Use Threshold for PEMS testing specified in Part II, Subpart A, section 3.5.1.2. An engine shall fail in-use testing if the SOS emissions for any pollutant in any bin exceeds the applicable SOS Emissions In-Use Threshold for PEMS testing.

3.5.2 **California Provisions**

3.5.2.1 PEMS Bin A shall have a minimum of 2,400 valid windows

3.5.2.1.1 If PEMS Bin A window requirements are not met, an engine manufacturer may idle the engine at the end of the shift-day to increase the number of windows in PEMS Bin A. If the vehicle has tamper-resistant idle-reduction technology that prevents idling, populate PEMS Bin A with additional windows by setting the 1-Hz emission rate for all regulated pollutants to zero as described in Part II, Subpart A, section 3.4.6 to achieve exactly 2,400 PEMS Bin A windows.

3.5.2.2 PEMS Bins B shall have a minimum of 10,000 windows. If the minimum window requirement in section 3.5.2.2, above, is not met, the engine manufacturer shall conduct additional days of testing to achieve the minimum window requirements for each bin. The engine manufacturer shall continue testing additional shift-days as necessary to achieve the minimum window requirements for each bin.

3.5.2.3 Constant-speed engines, such as generators and pumps, are required to use the procedures in Part II, Subpart A, section 3 for in-use testing. If there are fewer windows than required for PEMS Bins A or B , then the bin shall not be evaluated, and the engine manufacturer shall continue additional days of testing until at least one bin meets the window requirements under Part II, Subpart A, section 3.5.2.1 and section 3.5.2.2. At least one bin shall be evaluated for a complete test.

3.6 **Engine Family Pass Criteria**

3.6.1 **§ 1036.425 Pass criteria for engine families.** January 24, 2023.

3.6.1.1 Introductory paragraph: [No change.]

3.6.1.2 Delete subparagraph (a). Replace with the following: Start by measuring emissions from four engines using the procedures described in Part II, Subpart C. If all four engines comply fully with the SOS Emissions In-Use Thresholds in Part II, Subpart A, section 3.5.1.2, the engine family passes, and the engine manufacturer may stop testing.

3.6.1.3 Subparagraph (b): [No change.]

3.6.1.4 Subparagraph (c): [No change, except that the reference to "§ 1036.530(g)" shall mean "Part II, Subpart C, section 3.1.7."]

3.6.1.5 Subparagraph (d): [No change.]

3.6.2 If an engine family is non-compliant with the SOS Emissions In-Use Thresholds in Part II, Subpart A, section 3.5.1.2 based on the criteria in Part II, Subpart A, section 3.6.1, and the arithmetic mean of the sum-over-sum emissions for any pollutant are greater than the SOS Emissions In-Use Thresholds in Part II, Subpart A, section 3.5.1.2, CARB shall initiate discussions with the manufacturer for corrective action.

3.6.3 If the number of California engine sales is less than ten for the engine family, the engine manufacturer shall test all engines that are located in California for the engine family and calculate the arithmetic mean of the tested engines as specified in Part II, Subpart C, section 3.1.7. If the mean values are at or below the off-cycle bin standards, the engine family shall pass PEMS testing. If the mean value for any pollutant is above an off-cycle bin standard, the engine family shall fail PEMS testing.

3.7 **Moving Average Window (MAW) PEMS Testing Reporting**

3.7.1 **§ 1036.430 Reporting requirements.** January 24, 2023.

3.7.1.1 Subparagraph (a): Amend as follows:

3.7.1.1.1 Subparagraph (1): Amend as follows:

3.7.1.1.1.1 Introductory sentence: [No change.]

3.7.1.1.1.2 Subparagraphs (i) and (ii): [No change.]

3.7.1.1.1.3 Delete subparagraph (iii). Replace with the following: Identify how many engines you have tested from the applicable engine family and how many engines still need to be tested.

Identify how many tested engines have passed or failed under Part II, Subpart A, section 3.5.

3.7.1.1.1.4 Delete subparagraph (iv). Replace with the following: After the final test, report the results and state the outcome of testing for the engine family based on the criteria in Part II, Subpart A, section 3.6.

3.7.1.1.1.5 Subparagraph (v): [No change.]

3.7.1.1.2 Subparagraph (2): [No change, except that “vehicle” shall mean “equipment” and “OBD” shall mean “OR OBD.”]

3.7.1.1.3 Subparagraph (3): Amend as follows:

3.7.1.1.3.1 Introductory sentence: [No change.]

3.7.1.1.3.2 Subparagraphs (i) and (ii): [No change.]

3.7.1.1.3.3 Delete subparagraph (iii). Replace with the following: Working conditions and work site and location of testing. You may base this description on the output from a global-positioning system (GPS).

3.7.1.1.3.4 Subparagraphs (iv) and (v): [No change, except that “vehicle” shall mean “equipment.”]

3.7.1.1.3.5 Delete subparagraph (vi). Replace with the following: The number of hours indicated by the “hour meter” for the engine at the start of testing. Include the engine's total lifetime hours of operation, if available.

3.7.1.1.3.6 Delete subparagraph (vii). Replace with the following: The number of windows in each bin (see Part II, Subpart A, section 3.5.2).

3.7.1.1.3.7 Delete subparagraph (viii). Replace with the following: The bin emission value per piece of equipment for each pollutant, as determined in accordance with Part II, Subpart A, section 3.5.1. Describe the method you used to determine NMHC as specified in Part IV: 40 CFR PART 1065, Subpart G, section 1065.660, subparagraph (b).

3.7.1.1.3.8 Subparagraph (ix): [No change, except that emissions of NMHC shall also be recorded.]

3.7.1.1.4 Subparagraph (4): Amend as follows:

3.7.1.1.4.1 Introductory sentence: [No change.]

3.7.1.1.4.2 Delete subparagraph (i). Replace with the following: State whether the engine meets the SOS Emissions In-Use Thresholds for each bin for each pollutant as described in Part II, Subpart A, section 3.5.1.

3.7.1.1.4.3 Subparagraphs (ii) through (vi): [No change, except that "vehicle" shall mean "equipment" and "OBD" shall mean "OR OBD."]

3.7.1.2 Subparagraph (b): [No change.]

3.7.1.3 Subparagraph (c): Amend as follows:

3.7.1.3.1 Introductory sentence: [No change.]

3.7.1.3.2 Subparagraph (1): [No change.]

3.7.1.3.3 Delete subparagraph (2). Replace with the following: The engine manufacturer shall notify CARB if its review of the test data for an engine family indicates that two of the initial tested engines have failed to comply with the engine-pass criteria in Part II, Subpart A, section 3.5.

3.7.1.3.4 Delete subparagraph (3). Replace with the following: The engine manufacturer shall notify CARB if its review of the test data for an engine family indicates that the engine family does not comply with the engine family-pass criteria in Part II, Subpart A, section 3.6.

3.7.1.3.5 Subparagraph (4): [No change, except that "vehicle" shall mean "equipment."]

3.8 **MAW In-Use Records**

3.8.1 **§ 1036.435 Recordkeeping requirements.** January 24, 2023.

3.8.1.1 Introductory paragraph: [No change.]

3.8.1.2 Subparagraph (a): [No change.]

3.8.1.3 Subparagraph (b): Amend as follows:

3.8.1.3.1 Introductory sentence: [No change.]

3.8.1.3.2 Subparagraphs (1) through (3): [No change.]

3.8.1.3.3 Delete subparagraph (4). Replace with the following: Evaluations to determine why an engine failed any of the SOS Emissions In-Use Thresholds described in Part II, Subpart A, section 3.5.1.2.

3.8.1.4 Subparagraph (c): [No change.]

3.9 **Warranty Requirements for In-Use Testing**

3.9.1 **§ 1036.440 Warranty obligations related to in-use testing.** January 24, 2023.

Delete §1036.440 paragraph. Replace with the following: Testing under this subpart that finds that an engine exceeds SOS Emissions In-Use Thresholds under this subpart is not by itself sufficient to show a breach of warranty under title 13, CCR, section 2425.2. A breach of warranty would require that engines fail to meet one or both of the conditions specified in title 13, CCR, section 2425.2, subsection (b).

4. Corrective Action.

4.1 If PEMS testing shows an engine family is not compliant with the SOS Emissions In-Use Thresholds in Part II, Subpart A, section 3.5.1.2, then the manufacturer shall take steps to correct the noncompliance defined in title 13, CCR, section 2112.1 in accordance with title 13, CCR, sections 2113.1 and 2125.1.

4.2 A manufacturer may opt to perform corrective action without conducting PEMS testing if it identifies emission control problems based on the ECU and sensor data screening conducted under Part II, Subpart A, section 1.

Subpart B – CARB-Run Off-Road In-Use Compliance (ORIUC) Program.

Engines in all power categories are subject to CARB's ORIUC program. Testing under CARB's ORIUC program may be conducted using either PEMS testing or engine dynamometer testing as follows:

1. **CARB-Run ORIUC Program for Tier 5 Final Engines < 56 kW and Tier 5 Final Engines > 560 kW**

1.1 CARB may perform in-use testing of any engine subject to the standards in title 13, CCR, section 2423.1 using the applicable certification test cycle for the engine or using the "Not-To-Exceed" provisions in Part II, Subpart B, sections 1.2 through 1.6. However, CARB will limit recall testing to the first 75 percent of each engine's useful life as specified in title 13, CCR, section 2421.1, subsection (b)(2).

1.2 **Selection and Screening Equipment and Engines for Testing**.

1.2.1 **§ 1036.410 Selecting and screening vehicles and engines for testing.** January 24, 2023.

1.2.1.1 Delete subparagraph (a). Replace with the following: CARB shall select and screen engines in accordance with title 13, CCR, section 2137.1, in addition to the criteria set forth in paragraph (b) of this section.

1.2.1.2 Subparagraph (b): Amend as follows:

1.2.1.2.1 Introductory sentence: CARB shall select engines for testing that meet the following criteria, in addition to the criteria set forth in title 13, CCR, section 2137.1, subsection (b).

1.2.1.2.2 Subparagraph (1): [No change.]

1.2.1.2.3 Delete subparagraph (2). Replace with the following: Powertrain, drivetrain, emission controls, and other key engine systems have been properly maintained and used. See Part III: 40 CFR PART 1039, Subpart B, Section 1039.125.

1.2.1.2.4 Subparagraph (3): [No change.]

1.2.1.2.5 Subparagraph (4): The engines have not been misfueled. Do not consider engines misfueled if they have used fuel meeting the specifications of Part II, Subpart B, section 1.3.1.3.

1.2.1.2.6 Subparagraph (5): The engines are likely to operate for at least three hours of non-idle operation over a complete shift-day, as described in Part II, Subpart B, section 1.3.1.6.

1.2.1.2.7 Delete subparagraph (6). Replace with the following: The engines have not exceeded 75 percent of applicable useful life; CARB shall otherwise not exclude engines from testing based on their age or mileage.

1.2.1.2.8 Subparagraph (7): [No change.]

1.2.1.3 Subparagraph (c): [n/a]

1.3 **Preparing and Testing Engines**.

1.3.1 **§ 1036.415 Preparing and testing engines.** April 22, 2024.

1.3.1.1 Delete subparagraph (a). Replace with the following: CARB shall limit maintenance to what is in the owner's manual for engines with that amount of service and age. For anything CARB considers an adjustable

parameter (see Part III: 40 CFR, PART 1039, Subpart B, § 1039.115, subparagraph (e)), CARB shall adjust that parameter only if it is outside its adjustable range. CARB shall then set the adjustable parameter to the manufacturer's recommended setting or the mid-point of its adjustable range. CARB shall conduct restorative maintenance in accordance with title 13, CCR, section 2138.1.

1.3.1.2 Subparagraph (b): [No change]

1.3.1.3 Subparagraph (c): Amend as follows:

1.3.1.3.1 Introductory sentence: [No change.]

1.3.1.3.2 Subparagraph (1): [No change, except add the following: CARB may use any commercially available biodiesel fuel blend up to 20 percent biodiesel content (B20) that meets the specifications listed in title 4, CCR, section 4148.]

1.3.1.3.3 Subparagraphs (2) through (4): [No change.]

1.3.1.3.4 Delete subparagraph (5). Replace with the following: CARB may take fuel samples from test engines to ensure that appropriate fuels were used during field testing. CARB may drain engines' fuel tanks and refill them with diesel fuel conforming to the specifications described in subparagraph (c)(1) of this section 1036.415.

1.3.1.4 Subparagraph (d): Amend as follows:

1.3.1.4.1 Delete introductory paragraph. Replace with the following: CARB shall test the selected engines using the test procedure described in Part II, Subpart B, section 1.4 while they remain installed in the engine. CARB shall measure emissions as follows:

1.3.1.4.2 Delete subparagraph (1). Replace with the following: CARB shall perform all testing with PEMS and field-testing procedures referenced in Part IV: 40 CFR, PART 1065, Subpart J. CARB shall measure emissions of HC, NMHC, NO_X, PM, CO, and CO_2. CARB shall measure or determine O_2 emissions using good engineering judgement. CARB shall determine HC emissions by any method specified in Part IV: 40 CFR, PART 1065, Subpart G, § 1065.660, subparagraph (b).

1.3.1.4.3 Delete subparagraph (2). Replace with the following: If the engine's crankcase discharges emissions into the ambient atmosphere, as allowed by Part III: 40 CFR, PART 1039, Subpart B, § 1039.115, subparagraph (a), CARB shall either route all crankcase emissions into the exhaust for a combined measurement or add the

crankcase emission values specified in Part III: 40 CFR PART 1039, Subpart C, § 1039.240, section 3 to represent emission levels at full useful life instead of measuring crankcase emissions in the field.

1.3.1.5 Subparagraph (e): [No change.]

1.3.1.6 Delete subparagraph (f). Replace with the following: Once an engine is set up for testing, CARB shall test the engine for at least one shift-day. To complete a shift-day's worth of testing, CARB shall start sampling at the beginning of a shift and continue sampling for the whole shift, subject to the calibration requirements of the portable emissions measurement systems. A shift-day is the period of a normal workday for an individual employee. If the first shift-day of testing does not involve at least 3 hours of accumulated non-idle operation, CARB shall repeat the testing for a second shift-day and report the results from both days of testing. If the second shift-day of testing also does not result in at least 3 hours of accumulated non-idle operation, CARB shall choose whether or not to continue testing with that engine. If after two shift-days, CARB may discontinue testing before accumulating 3 hours of non-idle operation on either day, evaluate the valid NTE samples from both days of testing as described in Part II, Subpart B, section 1.6. CARB shall count the engine toward meeting the testing requirements under this subpart and use the data for deciding whether additional engines must be tested under Part II, Subpart B, section 1.7.

1.3.1.7 Delete subparagraph (g): Replace with the following: For stop-start and automatic engine shutdown systems, CARB shall override idle-reduction features if they are adjustable. If those systems cannot be overridden, CARB shall set the 1-Hz emission rate to zero for all regulated pollutants when the idle-reduction feature is active.

1.3.2 **California Provisions**

1.3.2.1 CARB has the option to test longer than the two shift-day period described in Part II, Subpart B, section 1.3.1.6.

1.3.2.2 CARB may count an engine as meeting the engine-pass criteria described in Part II, Subpart B, section 1.6 if a shift-day of testing or two shift-days of testing (with the requisite non-idle/idle operation time as in Part II, Subpart B, section 1.3.1.6), or if the extended testing CARB elects under Part II, Subpart B, section 1.3.2.1 does not generate a single valid NTE sampling event, as described in Part II, Subpart B, section 1.6.3. CARB shall count the engine towards meeting testing requirements under this subpart.

1.3.2.3 For engines designed to discharge crankcase emissions to the ambient atmosphere, CARB shall use deteriorated emission levels to represent crankcase emissions at the end of useful life for purposes of demonstrating compliance with NTE standards. CARB shall use a brake-specific crankcase emission result for each pollutant based on operation over the applicable certification cycle reported by the manufacturer. CARB shall apply crankcase deterioration factors to all these crankcase emission results as described in Part II, Subpart B, section 1.6. CARB shall round the adjusted figures to the same number of decimal places as the NTE standards in Part II, Subpart B, section 1.5.

1.4 **§ 86.1370 Not-To-Exceed test procedures.** October 25, 2016.

1.4.1 Subparagraph (a): [No change, except that the reference to the "the Not-To-Exceed Limits specified in § 86.007-11(a)(4), or to later Not-To-Exceed Limits" means the "the Not-To-Exceed Limits specified in Part II, Subpart B, section 1.5."

1.4.2 Subparagraph (b): Amend as follows:

1.4.2.1 References to "heavy-duty engines" shall mean "off-road compression-ignition engines and marine compression-ignition engines."

1.4.2.2 Subparagraphs (1) through (5): [No change.]

1.4.2.3 Subparagraph (6) and (7): [n/a]

1.4.3 Subparagraph (c): [n/a]

1.4.4 Subparagraphs (d): [No change, except that the reference to "§ 86.007-11(a)(4)" in subparagraph (d)(1) shall mean "Part II, Subpart B, section 1.5 of these test procedures", and reference to "§ 86.1912" in subparagraph (d)(2)(iv) shall mean "Part II, Subpart A, section 1.6 of these test procedures".]

1.4.5 Subparagraphs (e): [No change, except that the reference to "§ 86.007-11(a)(4)(ii)(A)" in subparagraph (e)(1) shall mean "Part II, Subpart B, section 1.5.2.1" and the reference to "§ 86.007-11(a)(4)(ii)(B)" in subparagraph (e)(2) shall mean "Part II, Subpart B, section 1.5.2.2."]

1.4.6 Subparagraphs (f) through (g): [No change.]

1.4.7 Delete subparagraph (h). Replace with the following: Any emission measurements corresponding to engine operating conditions that do not qualify as a valid NTE sampling event may be excluded from the determination of the engine-pass ratio specified in Part II, Subpart B, section 1.6 for the specific pollutant.

1.4.8 Subparagraph (i): [No change.]

1.4.9 Delete subparagraph (j). Replace with the following: Emergency engine AECDs. If your engine family includes engines with one or more approved AECDs for emergency engine applications under Part III: 40 CFR PART 1039, Subpart B, § 1039.115, subparagraph (g), the NTE emission limits do not apply when any of these AECDs are active.

1.5 **"Not-to-Exceed" Emission limits, standards and supplemental requirements for Tier 5 engines certified to title 13, CCR, section 2423.1.**

This section applies to new off-road compression-ignition engines and equipment that are < 56 kW and > 560 kW that are certified to the Tier 5 final exhaust emission standards in title 13, CCR, section 2423.1.

1.5.1 **Not-to-Exceed Standards**

1.5.1.1 The brake-specific exhaust NMHC or NO_X emissions in g/kW-hr, as determined under Part II, Subpart B, section 1.4 pertaining to the not-to-exceed test procedures, shall not exceed 1.5 times the applicable NMHC or NO_X emission standards or FELs specified in title 13, CCR, section 2423.1, subsection (d)(1), during engine and equipment operation specified in Part II, Subpart B, section 1.5.2, except as noted in Part II, Subpart B, section 1.5.3.

1.5.1.2 The brake-specific exhaust PM emissions in g/kW-hr, as determined under Part II, Subpart B, section 1.4 pertaining to the not-to-exceed test procedures, shall not exceed 1.5 times the applicable PM emission standards or FEL (for FELs above the standard only) specified in title 13, CCR, section 2423.1, subsection (d)(1), during engine and equipment operation specified in Part II, Subpart B, section 1.5.2, except as noted in Part II, Subpart B, section 1.5.3.

1.5.1.3 The brake-specific exhaust CO emissions in g/kW-hr, as determined under Part II, Subpart B, section 1.4 pertaining to the not-to-exceed test procedures, shall not exceed 1.25 times the applicable CO emission standards or FEL specified in title 13, CCR, section 2423.1, subsection (d)(1), during engine and equipment operation specified in Part II, Subpart B, section 1.5.2, except as noted in Part II, Subpart B, section 1.5.3.

1.5.2 For each engine family, the not-to-exceed emission limits shall apply during one of the following two ambient operating regions:

1.5.2.1 **Ambient Operating Region 1**: The not-to-exceed limits apply for all altitudes less than or equal to 5,500 feet above sea level, during all ambient conditions (temperature and humidity). Temperature and humidity

ranges for which correction factors are allowed are specified in Part II, Subpart B, section 1.4.5; or

1.5.2.2 **Ambient Operating Region 2**

1.5.2.2.1 The not-to-exceed emission limits apply for all altitudes less than or equal to 5,500 feet above sea level, for temperatures less than or equal to the temperature determined by the following equation at the specified altitude:

$$T = -0.00254 \times A + 100$$

Where:

T = ambient air temperature in degrees Fahrenheit.

A = altitude in feet above sea-level (A is negative for altitudes below sea-level).

1.5.2.2.2 Temperature and humidity ranges for which correction factors are allowed are specified in Part II, Subpart B, section 1.4.5.

1.5.3 For engines equipped with exhaust gas recirculation, the not-to-exceed emission limits specified in Part II, Subpart B, section 1.5.1 do not apply to engine or equipment operation during cold operating conditions as specified in Part II, Subpart B, section 1.4.6, subparagraph (f).

1.5.4 The emission limits specified in this section shall be rounded to the same number of significant figures as the applicable standards in title 13, CCR, section 2423.1, subsection (d)(1) for Tier 5 engines or in title 13, CCR, section 2423.2 for marine engines using ASTM E29-22.

1.6 **§ 86.1912 How do I determine whether an engine meets the vehicle-pass criteria?** October 25, 2016.

1.6.1 Delete introductory paragraph. Replace with the following: In general, the average emissions for each regulated pollutant shall remain at or below the NTE threshold in subsection 1.6.2 of this section for at least 90 percent of the valid NTE sampling events, as defined in subsection 1.6.3 of this section. Perform the following steps to determine whether an engine meets the engine-pass criteria:

1.6.2 Subparagraph (a): Amend as follows:

1.6.2.1 Delete introductory paragraph. Replace with the following: Determine the NTE threshold for each pollutant subject to an NTE standard by adding the two following terms in sections 1.6.2.1 and 1.6.2.3 and

rounding the result to the same number of decimal places as the applicable NTE standard:

1.6.2.2 Delete subparagraph (1). Replace with the following: The applicable NTE standard defined in Part II Subpart B, section 1.5.1.

1.6.2.3 Subparagraph (2): [n/a]

1.6.2.4 Delete subparagraph (3). Replace with the following: Accuracy margins for portable in-use equipment for 2031 or later model year engine families that are selected for testing in any calendar year as follows:

1.6.2.4.1 Delete subparagraph (i). Replace with the following: NMHC: 0.013 g/kW-hr.

1.6.2.4.2 Delete subparagraph (ii). Replace with the following: CO: 0.034 g/kW-hr.

1.6.2.4.3 Delete subparagraph (iii). Replace with the following: NOx: 0.007 g/kW-hr.

1.6.2.4.4 Delete subparagraph (iv). Replace with the following: PM: 0.008 g/kW-hr.

1.6.2.4.5 Delete subparagraph (v): Replace with the following: NOx+NMHC: 0.020 g/kW-hr

1.6.2.5 Subparagraphs (4) and (5): [n/a]

1.6.3 Subparagraph (b): [No change, except that references to "§ 86.1370-2007" shall mean "Part II, Subpart B, section 1.4" and any provisions that apply to an "allowed deficiency area" shall not apply.]

1.6.4 Subparagraphs (c): [No change.]

1.6.5 Delete subparagraph (d). Replace with the following: If the engine has an open crankcase, CARB shall account for these emissions in accordance to Part III: 40 CFR PART 1039, Subpart C, §1039.240, section 3 for every NTE event.

1.6.6 Subparagraphs (e) and (f): [No change.]

1.6.7 Subparagraph (g): Amend as follows:

1.6.7.1 Introductory paragraph: [No change.]

1.6.7.2 Subparagraph (1): [No change.]

1.6.7.3 Subparagraph (2): [n/a]

1.7 **§ 1036.425 Pass criteria for engine families.** January 24, 2023.

1.7.1 Delete introductory paragraph. Replace with the following: For in-use compliance testing under Part II, Subpart B, section 1.3, CARB shall determine the number of engines to test from each selected engine family and the family pass criteria as follows:

1.7.2 Subparagraph (a): [No change, except that reference to "Subpart E and § 1036.530" shall mean "Part II, Subpart B, section 1.4" and "off-cycle bin standards" shall mean "engine-pass criteria in Part II, Subpart B, section 1.6"]

1.7.3 Subparagraph (b): [No change, except that "off-cycle bin standards" shall mean "engine-pass criteria in Part II, Subpart B, section 1.6"]

1.7.4 Subparagraph (c): Amend as follows: If two or more engines tested under Part II, Subpart B, sections 1.7.2 and 1.7.3 of this section do not comply fully with the engine-pass criteria in Part II, Subpart B, section 1.6, we shall test additional engines until we have tested a total of ten engines. If three or more of the ten engines tested do not comply fully with the engine-pass criteria in Part II, Subpart B, Section 1.6, the engine family fails and is deemed to be noncompliant.

1.7.5 Subparagraph (d): [n/a]

1.8 **California Provision**

If an engine family is noncompliant based on the criteria in Part II, Subpart B, section 1.7 of this section, CARB shall notify the manufacturer of the test results. Upon receipt of the notification, the manufacturer shall submit a voluntary or influenced recall plan in accordance with title 13, CCR, sections 2113.1, 2114.1, 2115, 2116.1, 2117, 2118.1, 2119, 2120, and 2121.1. If no such recall plan is approved by the Executive Officer, the Executive Officer shall order corrective action including recall of the affected pieces of equipment in accordance with title 13, CCR, sections 2122.1, 2123, 2124.1, 2125.1, 2126.1, 2127.1, 2128.1, 2129, 2130.1, 2131, 2132, 2133, 2134, and 2135.

2 CARB-Run ORIUC Program for Tier 5 Final Engines 56 ≤ kW ≤ 560

2.1 CARB's ORIUC Program for these power categories may be conducted using either PEMS testing or engine dynamometer testing as follows.

2.1.1 CARB may perform in-use testing of any engine subject to the standards in title 13, CCR, section 2423.1 using the applicable certification test cycle for the engine.

2.1.2 CARB may perform in-use testing of any engine subject to the standards in title 13, CCR, section 2423.1 using PEMS testing in accordance with Part II, Subpart A, section 3 and Subpart C.

2.1.3 If an engine family is noncompliant based on the criteria in Part II, Subpart A, section 3.6, CARB shall notify the manufacturer of the test results. Upon receipt of the notification, the manufacturer shall submit a voluntary or influenced recall plan in accordance with title 13, CCR, sections 2113.1, 2114.1, 2115, 2116.1, 2117, 2118.1, 2119, 2120, and 2121.1. If no such recall plan is approved by the Executive Officer, the Executive Officer shall order corrective action including recall of the affected pieces of equipment in accordance with title 13, CCR, sections 2122.1, 2123, 2124.1, 2125.1, 2126.1, 2127.1, 2128.1, 2129, 2130.1, 2131, 2132, 2133, 2134, and 2135

2.2 We will limit recall testing to the first 75 percent of each engine's useful life as specified in title 13, CCR, section 2421.1, subsection (b)(2).

3 CARB-Run ORIUC Program for Tier 5 Interim Engines in All Power Categories

3.1 CARB may perform in-use testing of any engine subject to the Tier 5 interim standards in title 13, CCR, section 2423.1 using the applicable certification test cycle for the engine or using the “Not-To-Exceed” provisions in Part II, Subpart B, section 1, except that In Part II, Subpart B, section 1.6.2.1, the reference to “the applicable NRTC Tier 5 final standard in title 13, CCR, section 2423.1, subsection (d)(1)(A)” shall mean “the applicable NRTC Tier 5 interim standard in title 13, CCR, section 2423.1, subsection (d)(1)(A).”

3.2 CARB will limit recall testing to the first 75 percent of each engine's useful life as specified in title 13, CCR, section 2421.1, subsection (b)(2).

4 CARB-Run ORIUC Program for 2031 and Subsequent Model Year Marine Compression-Ignition Engines Below 37 kW

4.1 CARB may perform in-use testing of any engine subject to the emission standards in title 13, CCR, section 2423.2 using the applicable certification test cycle for the engine or using the “Not-To-Exceed” provisions in Part II, Subpart B, sections 1.2 through 1.6, except as follows:

4.1.1 In Part II, Subpart B, section 1.2.1, the reference to “title 13, CCR, section 2421.1, subsection (b)(2)” shall mean “title 13, CCR, section 2421, subsection (a)(60).”

4.1.2 In Part II, Subpart B, section 1.5, all references to “title 13, CCR, section 2423.1, subsection (d)(1)” shall mean “title 13, CCR, section 2423.2, subsection (d)(1).”

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

4.1.3 In Part II, Subpart B, section 1.6.2.1, the reference to “the applicable NRTC Tier 5 final standard in title 13, CCR, section 2423.1, subsection (d)(1)(A)” shall mean “the applicable standard in title 13, CCR, section 2423.2, subsection (d)(1).”

4.2 CARB will limit recall testing to the first 75 percent of each engine's useful life as specified in title 13, CCR, section 2421.1, subsection (b)(2).

Subpart C – In-Use Testing Requirements Using the Moving Average Window Procedure.

1. **Purpose of Subpart C**

This subpart describes the measurement and calculation procedures to evaluate in-use PEMS testing results and determine whether tested engines and engine families meet SOS Emissions In-Use Thresholds under Part II, Subpart A, section 3.5.1.

2. **Attestation**

A manufacturer shall attest at time of certification that the engine being certified shall meet the SOS Emissions In-Use Thresholds in Part II, Subpart A, section 3.5.1.

3. **Two Bin Moving Average Window (2B-MAW) Test Procedures**

3.1 **§ 1036.530 Test procedures for off-cycle testing**. April 22, 2024.

3.1.1 Delete subparagraph (a). Replace with the following: ***General.*** This section describes the measurement and calculation procedures to perform field testing and determine whether tested engines and engine families meet SOS Emissions In-Use Thresholds in Part II, Subpart A, section 3.5.1.2. Calculate mass emission rates as specified in Part IV: 40 CFR PART 1065, Subpart G. Use good engineering judgment to adapt these procedures for simulating equipment operation in the laboratory.

3.1.2 Subparagraph (b): ***Vehicle preparation and measurement procedures***.

3.1.2.1 Title of subparagraph: [No change.]

3.1.2.2 Subparagraphs (1) and (2): [No change.]

3.1.2.3 Delete subparagraph (3). Replace with the following: Measure emissions over one or more shift-days as specified in Part II, Subpart A, section 3.4.

3.1.2.4 Subparagraph (4): [No change.]

3.1.3 Subparagraph (c): ***Test Intervals.*** Determine the test intervals as follows:

3.1.3.1 Subparagraph (1): [n/a]

3.1.3.2 Subparagraph (2): [No change.]

3.1.3.3 Subparagraph (3): ***Excluded data.*** Exclude data from test intervals for any period meeting one or more of the following conditions:

3.1.3.3.1 Subparagraph (i): [No change.]

3.1.3.3.2 Delete subparagraph (ii). Replace with the following: The engine is off, except as specified in Part II, Subpart A, section 3.4.7.

3.1.3.3.3 Subparagraphs (iii) through (v): [No change.]

3.1.3.3.4 Delete subparagraph (vi). Replace with the following: An engine has one or more active AECDs for emergency vehicles under Part III: 40 CFR PART 1039, Subpart B, section 1039.115, subparagraphs (g)(4) and (g)(5).

3.1.3.3.5 Subparagraph (vii): [No change.]

3.1.4 Subparagraph (d): [No change.]

3.1.5 Subparagraph (e): [No change, except that "P_{max}" shall mean "the emission-data engine's declared maximum power for the engine family" and references to "FTP" shall mean "NRTC" and references to "SET duty cycle" shall mean "the applicable steady-state duty cycle."]

3.1.6 Delete subparagraph (f). Replace with the following: ***Binning 300 second test intervals.*** For engines subject to compression-ignition standards, identify the appropriate bin for each of the 300 second test intervals based on its normalized CO_2 emission mass, $m_{CO2,norm,testinterval,}$ as follows:

Criteria for Off-Cycle PEMS Bins

PEMS Bin	Normalized CO_2 emission mass over the 300 second test interval
PEMS Bin A: Engine Idle	$m_{CO2,norm,testinterval} \leq 8.0\%$
PEMS Bin B: Engine Non-idle Operation	$8.0\% < m_{CO2,norm,testinterval}$

3.1.7 Subparagraph (g): ***Off-cycle emissions quantities.*** Determine the off-cycle emissions quantities as follows:

3.1.7.1 Subparagraph (1): [n/a]

3.1.7.2 Subparagraph (2): ***Compression-ignition.*** For engines subject to compression-ignition standards, determine the off-cycle emission quantity for each bin. When calculating mean bin emissions from ten engines to apply the pass criteria for engine families in Part II, Subpart A, section 3.6, set any negative off-cycle emissions quantity to zero before calculating mean bin emissions.

3.1.7.2.1 Subparagraph (i): Amend as follows:

3.1.7.2.1.1 Delete introductory paragraph and equation. Replace with the following: ***Off-cycle emissions quantity for PEMS Bin A.*** The off-cycle emission quantity for PEMS Bin A, $\bar{\dot{m}}_{NOx,offcycle,PEMS\ BinA}$, is the mean NO_X mass emission rate from all test intervals associated with PEMS Bin A as calculated using the following equation:

$$\overline{\dot{m}}_{NOx,offcycle,PEMS\ Bin\ A} = \frac{\sum_{i=1}^{N} m_{NOx,testinterval,i}}{\sum_{i=1}^{N} t_{testinterval,i}}$$

Where:

i = an indexing variable that represents one 300 second test interval.

N = total number of 300 second test intervals in PEMS Bin A.

$m_{NOXtestinterval,i}$ = total NO_X emission mass over the test interval *i* in PEMS Bin A as determined in subparagraph (d)(2) of this section.

$t_{testinterval,i}$ = total time of test interval *i* in PEMS Bin A as determined in subparagraph (d)(1) of this section. Note that the nominal value is 300 seconds.

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

3.1.7.2.1.2 *Example*: [No change, except add the following Note: The example provided in subparagraph (i) is only intended to be an example of a calculation for determining off-cycle emission quantities for PEMS Bin A. There are no changes to the example provided in subparagraph (i), except that "bin 1" shall mean "PEMS Bin A" and "hp-hr" shall mean "kW-hr." This example is for illustrative purposes only.]

3.1.7.2.2 Subparagraph (ii): Amend as follows:

3.1.7.2.2.1 Delete introductory paragraph and equation. Replace with the following: ***Off-cycle emissions quantity for PEMS Bin B.*** The off-cycle emission quantity for PEMS Bin B, $e_{[emission],offcycle,PEMS\ BinB}$, is the value for CO_2-specific emission mass for a given pollutant of all the 300 second test intervals in PEMS Bin B, combined and converted to a brake-specific value, as calculated for each measured pollutant using the following equation:

$$e_{[emissions],offcycle,PEMS\ Bin\ B} = \frac{\sum_{i=1}^{N} m_{[emission],testinterval,i}}{\sum_{i=1}^{N} m_{CO2,testinterval,i}} \times e_{CO2}$$

Where:

i = an indexing variable that represents one 300 second test interval.

N = total number of 300 second test intervals in PEMS Bin B.

$m_{[emission],testinterval,i}$ = total emission mass for a given pollutant over the test interval *i* in PEMS Bin B, as determined in paragraph (d)(2) of this section.

$m_{CO2,testinterval,i}$ = total CO_2 emission mass over the test interval *i* in PEMS Bin B, as determined in subparagraph (d)(2) of this section.

e_{CO2} = The CO_2 emission rate from the certification test data of the emission-data engine over the NRTC duty cycle, as determined in accordance with Part III: 40 CFR PART 1039, section 1039.235, except for constant speed engines. For constant speed engines, e_{CO2} = the CO_2 emission rate from the certification test data of the emission-data engine over the applicable steady-state duty cycle, as determined in accordance with Part III: 40 CFR PART 1039, Subpart C, section 1039.235.

3.1.7.2.2.2 *Example*: [No change, except add the following Note: The example provided in subparagraph (ii) is only intended to be an example of a calculation for determining off-cycle emission

quantities for PEMS Bin B. There are no changes to the example provided in subparagraph (ii), except that “bin 2” shall mean “PEMS Bin B” and “hp-hr” shall mean “kW-hr.” This example is for illustrative purposes only.]

3.1.8 Subparagraphs (h) and (i): [No change.]

3.1.9 Subparagraph (j): Amend as follows:

3.1.9.1 Introductory paragraph: [No change.]

3.1.9.2 Subparagraph (1): Amend as follows:

3.1.9.2.1 Introductory sentence and equation: [No change.]

3.1.9.2.2 *Example*: [No change, except that “P_{max}“ shall mean “the emission-data engine’s declared maximum power for the engine family”, and add the following Note: The example provided in subparagraph (1) is only intended to be an example of a calculation for determining the normalized equivalent CO_2 emission mass over each 300 second test interval. There are no changes to the example provided in subparagraph (i), except that “hp-hr” shall mean “kW-hr.” This example is for illustrative purposes only.

3.1.9.3 Subparagraph (2): Amend as follows:

3.1.9.3.1 Introductory sentence: [No change.]

3.1.9.3.2 Subparagraph (i): [n/a]

3.1.9.3.3 Delete subparagraph (ii). Replace with the following: For engines subject to compression-ignition standards, use the equation in Part II, Subpart C, section 3.1.7.2.1.1 to determine the off-cycle emission quantity for PEMS Bin A.

3.1.9.3.4 Subparagraph (iii): Amend as follows:

3.1.9.3.4.1 Delete introductory paragraph and equation. Replace with the following: For engines subject to compression-ignition standards, use the following equation to determine the off-cycle emission quantity for PEMS Bins B:

$$e_{[emissions],offcycle,PEMS\ Bin\ B} = \frac{\sum_{i=1}^{N} m_{[emission],testinterval,i}}{\sum_{i=1}^{N} W_{testinterval,i}}$$

Where:

i = an indexing variable that represents one 300 second test interval.

N = total number of 300 second test intervals in PEMS Bin B.

$m_{[emission],testinterval,i}$ = total emission mass for a given pollutant over the test interval *i* in PEMS Bin B, as determined in Part II, Subpart C, section 3.1.4.

$W_{testinterval,i}$ = total positive work over the test interval *i* in PEMS Bin B, as determined in Part IV: 40 CFR PART 1065, Subpart G, section 1065.650.

3.1.9.3.4.2 *Example:* [No change, except add the following Note: The example provided in subparagraph (iii) is only intended to be an example of a calculation for determining off-cycle emission quantities for PEMS Bins B. There are no changes to the example provided in subparagraph (iii), except that “bin 2” shall mean “PEMS Bin B” and “hp-hr” shall mean “kW-hr.” This example is for illustrative purposes only.]

Part III: 40 CFR PART 1039 – CONTROL OF EMISSIONS FROM NEW AND IN-USE OFF-ROAD COMPRESSION-IGNITION ENGINES

Subpart A – Overview and Applicability

§ 1039.1 Does this part apply for my engines? June 29, 2021.

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

2. Subparagraph (b). Amend as follows:

2.1 Introductory sentence: [No change.]

2.2 Delete subparagraph (1). Replace with the following: This part 1039 applies for all engines subject to the emission standards specified in title 13, CCR, section 2423.1.

2.3 Delete subparagraph (2). Replace with the following: If a manufacturer uses the provisions of Part III: 40 CFR PART 1039, section 1039.104, subparagraph (a) to certify an engine to the emission standards of title 13, CCR, section 2423.1 prior to the 2036 model year, all the requirements of this part apply for those engines, unless otherwise noted for engines that are certified to Tier 5 interim emission standards.

2.4 Delete subparagraph (3). Replace with the following: Engines originally meeting Tier 1, Tier 2, Tier 3, or Tier 4 standards are subject to the emission standards in title 13, CCR, section 2423 and the applicable test procedures as specified therein.

2.5 Subparagraph (4): [No change.]

3. Delete subparagraph (c). Replace with the following: The definition of “off-road compression-ignition engine” in title 13, CCR, section 2421.1, subsection (b)(2) and Part V: 40 CFR PART 1068, section 1068.30 exclude certain engines used in stationary applications. These engines may be required by title 17, CCR, section 93115 or Subpart IIII of 40 CFR Part 60 to comply with some of the provisions of this Part III: 40 CFR PART 1039; otherwise, these engines are required to comply with the requirements in Part III: 40 CFR PART 1039, section 1039.20. In addition, the prohibitions in Part V: 40 CFR PART 1068, section 1068.101 restrict the use of stationary engines for nonstationary purposes unless they are certified under title 13, CCR, section 2423.1 to the same standards that would apply to off-road compression-ignition engines for the same model year.

4. Subparagraph (d): [n/a]

§ 1039.2 Who is responsible for compliance? October 25, 2016. [No change.]

§ 1039.5 Which engines are excluded from this part's requirements? October 25, 2016.

1. Introductory sentence: [No change.]

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

3. Delete subparagraph (e). Replace with the following: ***Engines used in recreational vehicles***. Engines certified to meet the requirements of title 13, CCR, Chapter 9, Article 3 or otherwise subject to title 13, CCR, Chapter 9, Article 3 (for example, engines used in snowmobiles and all-terrain vehicles) are not subject to the provisions of Part III: 40 CFR PART 1039.

§ 1039.10 How is this part organized? September 18, 2007. [No change.]

§ 1039.15 Do any other regulation parts apply to me? April 30, 2010. [No change.]

§ 1039.20 What requirements from this part apply to excluded stationary engines? June 29, 2021.

1. Introductory sentence: [No change.]

2. Subparagraph (a): Amend as follows:

2.1 Delete introductory paragraph. Replace with the following: An engine manufacturer shall add a permanent label or tag to each new engine produced or imported that is excluded under Part III: 40 CFR PART 1039, section 1039.1, subparagraph (c) as a stationary engine and is not required by title 17, CCR, section 93115 or 40 CFR Part 60, subpart IIII, to meet the requirements of this Part 1039 or title 13, CCR, Chapter 9, Article 4 that are equivalent to the requirements applicable to off-road or marine engines, respectively, for the same model year. To meet labeling requirements, an engine manufacturer shall do the following things:

2.2 Subparagraphs (1) through (5): [No change.]

3. Subparagraph (b): Amend as follows:

3.1 Introductory paragraph: [No change.]

3.2 Subparagraphs (1) through (3): [No change.]

3.3 Delete subparagraph (4). Replace with the following:

State: “THIS ENGINE IS EXEMPTED FROM THE REQUIREMENTS OF 13 CCR, CH 9, ARTICLE 4, AS A “STATIONARY ENGINE.” INSTALLING OR USING THIS ENGINE IN ANY OTHER APPLICATION MAY BE A VIOLATION OF CALIFORNIA LAW SUBJECT TO CIVIL PENALTY.” The referencing of similar federal requirements in combination with California references is permitted.

4. Delete subparagraph (c). Replace with the following: Stationary engines required by title 17, CCR, section 93115 or 40 CFR, Part 60, Subpart IIII, to meet the requirements of this part 1039 or the requirements in Part VII: 40 CFR PART 1042, shall meet the labeling requirements of 40 CFR, Part 60, section 60.4210.

§ 1039.30 Submission of information. October 25, 2016. [No change.]

Subpart B – Emission Standards and Related Requirements

§ 1039.101 What exhaust emission standards must my engines meet after the 2014 model year? June 29, 2021. [n/a]

Replace with the following: A manufacturer shall comply with the Tier 4 exhaust emission standards in title 13, CCR section 2423 or the Tier 5 exhaust emission standards in title 13, CCR section 2423.1, as applicable, in accordance with the “Implementation for Tier 5 Requirements” in title 13, CCR section 2423.1, subsection (e).

§ 1039.102 What exhaust emission standards and phase-in allowances apply for my engines in model year 2014 and earlier? June 29, 2021. [n/a]

§ 1039.104 Are there interim provisions that apply only for a limited time? June 29, 2021. [n/a]

§ 1039.105 What smoke opacity standards must my engines meet? January 24, 2023. [No change.]

§ 1039.107 What evaporative emission standards and requirements apply? October 25, 2016. [No change.]

§ 1039.110 Recording reductant use and other diagnostic functions. October 25, 2016. [No change.]

§ 1039.115 What other requirements apply? January 24, 2023. [No change.]

§ 1039.120 What emission-related warranty requirements apply to me? October 25, 2016.

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

2. Delete subparagraph (b). Replace with the following: ***Warranty period***. The engine manufacturer's emission-related warranty shall be valid for at least as long as the minimum warranty periods listed in title 13, CCR, section 2425.2 in hours of operation and years, whichever comes first. The engine manufacturer may offer an emission-related warranty that is more generous than CARB requires. The emission-related warranty for the engine shall not be shorter than any published warranty that is offered by the engine manufacturer without charge for the engine. Similarly, the emission-related warranty for any component shall not be shorter than any published warranty the engine manufacturer offers without charge for that component. If the engine manufacturer provides an extended warranty to individual owners for any components covered in subsection 3 of this section 1039.120 for an additional charge, the engine manufacturer's emission-related warranty shall cover those components for those owners to the same degree. If an engine has no hour meter, CARB shall base the warranty periods in title 13, CCR, section 2425.2 only on the engine's age (in years). The warranty period begins when the engine is placed into service.

3. Delete subparagraph (c). Replace with the following: ***Components covered***. The emission-related warranty covers all components whose failure would increase an engine's emissions of any regulated pollutant, including components listed in title 13, CCR, section 2425, subsection (d); Part V: 40 CFR PART 1068, Appendix A to Part 1068 of these test procedures; all components whose failure would cause the engine's malfunction indicator light to illuminate; and components from any other system you develop to control emissions. An engine manufacturer shall furnish with each new piece of equipment or engine a list of all components whose failure would cause the engine's malfunction indicator light to illuminate. The emission-related warranty shall cover these components even if another company produces the component.

4. Subparagraphs (d) and (e): [No change.]

§ 1039.125 What maintenance instructions must I give to buyers? October 25, 2016.

1. Introductory paragraph: [No change.]

2. Subparagraph (a): Amend as follows:

2.1 Introductory paragraph: [No change.]

2.2 Subparagraph (1): [No change.]

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

2.3 Subparagraph (2): Amend as follows:

2.3.1 Introductory sentence: [No change.]

2.3.2 Delete subparagraph (i). Replace with the following: For EGR-related filters, DEF filters, crankcase ventilation valves and filters, and fuel injector tips (cleaning only), the minimum interval is 1,500 hours.

2.3.3 Delete subparagraph (ii). Replace with the following: For the following components, including associated sensors and actuators, the minimum interval is 3,000 hours: Fuel injectors, turbochargers, catalytic converters, electronic control units, EGR systems (including related components, but excluding filters), and other add-on components.

2.3.4 Subparagraph (iii): [No change.]

2.4 Subparagraph (3): Amend as follows:

2.4.1 Introductory sentence: [No change.]

2.4.2 Delete subparagraph (i). Replace with the following: For EGR-related filters, DEF filters, crankcase ventilation valves and filters, and fuel injector tips (cleaning only), the minimum interval is 1,500 hours.

2.4.3 Delete subparagraph (ii): Replace with the following: For the following components, including associated sensors and actuators, the minimum interval is 4,500 hours: Fuel injectors, turbochargers, catalytic converters, electronic control units, EGR systems (including related components, but excluding filters), and other add-on components.

2.5 Subparagraph (4): [No change.]

2.6 Delete subparagraph (5). Replace with the following: The engine manufacturer may ask CARB to approve a maintenance interval shorter than that specified in subparagraphs (a)(2) and (a)(3) of this section under §1039.210, including emission-related components that were not in widespread use with off-road compression-ignition engines before 2011. In the engine manufacturer's request, the engine manufacturer shall describe the proposed maintenance step, recommend the maximum feasible interval for this maintenance, include the rationale with supporting evidence to support the need for the maintenance at the recommended interval, and demonstrate that the maintenance will be done at the recommended interval on in-use engines. In considering the engine manufacturer's request, CARB shall evaluate the information provided by the engine manufacturer and any other information available to CARB and U.S. EPA to establish alternate specifications for maintenance intervals, if appropriate. CARB will announce any decision we make under this subparagraph (a)(5) in a

CARB Manufacturers Advisory Correspondence or other suitable method of public communication. Anyone may request a hearing regarding such a decision (see Part III: 40 CFR PART 1039, Subpart I, section 1039.820).

2.7 Subparagraph (6): [No change.]

3. Subparagraphs (b) through (h): [No change.]

§ 1039.130 What installation instructions must I give to equipment manufacturers? October 25, 2016. [No change.]

§ 1039.135 How must I label and identify the engines I produce?

1. § 1039.135. June 29, 2021. Amend as follows:

1.1 Subparagraphs (a) and (b): [No change.]

1.2 Subparagraph (c): Amend as follows:

1.2.1 Introductory text: [No change.]

1.2.2 Subparagraphs (1) through (6): [No change.]

1.2.3 Delete subparagraph (7). Replace with the following: The engine manufacturer shall state the FELs to which the engines are certified if certification depends on the CA-ABT provisions of subpart H of this part.

1.2.4 Subparagraphs (8) through (11): [No change.]

1.2.5 Delete subparagraph (12). Replace with the following: The engine manufacturer shall state: “THIS ENGINE COMPLIES WITH CALIFORNIA REGULATIONS FOR [CURRENT MODEL YEAR] TIER 5 INTERIM OFF-ROAD COMPRESSION-IGNITION ENGINES UNDER 13 CCR 2423.1(e)(2)” or “THIS ENGINE COMPLIES WITH CALIFORNIA REGULATIONS FOR [CURRENT MODEL YEAR] TIER 5 FINAL OFF-ROAD COMPRESSION-IGNITION ENGINES UNDER 13 CCR 2423.1(e)(3),” as applicable. The referencing of similar federal requirements in combination with California references under this provision is permitted.

1.2.6 Subparagraphs (13) through (15): [No change.]

1.3 Subparagraphs (d) through (f): [No change.]

1.4 Subparagraph (g): Amend as follows:

1.4.1 Delete introductory paragraph. Replace with the following: If the equipment manufacturer obscures the engine label while installing the engine in the equipment such that the label is no longer readily visible as

described in title 13, CCR, section 2424, subsection (e), the equipment manufacturer shall place a duplicate label on the equipment. If others install an engine manufacturer's engine in their equipment in a way that obscures the engine label, CARB requires them to add a duplicate label on the equipment (see 40 CFR 1068.105); in that case, the engine manufacturer shall give them the number of duplicate labels they request and keep the following records for at least five calendar years from the date of issuance.

1.4.2 Subparagraphs (1) and (2): [No change.]

2. **California Provisions**

2.1 Add the following requirement. **Labeling requirements for rebuilt engines**. The provisions in title 13, CCR, section 2423.1, subsection (m), shall apply for labeling rebuilt engines.

2.2 Add the following requirement. **Labeling requirements for limited production engines.** The provisions in title 13, CCR, section 2423.1, subsection (f), shall apply for labeling limited production Tier 4 final engines and limited production Tier 5 interim engines.

§ 1039.140 What is my engine's maximum engine power? June 29, 2004. [No change.]

Subpart C – Certifying Engine Families

All of the requirements set forth in Part III: 40 CFR PART 1039, Subpart C shall apply to the certification of engine families subject to compression-ignition standards, unless otherwise stated.

§ 1039.201 What are the general requirements for obtaining a certificate of conformity? October 25, 2016. [No change.]

§ 1039.205 What must I include in my application?

1. § 1039.205. January 24, 2023. Amend as follows:

1.1 Introductory paragraph: [No change.]

1.2 Subparagraph (a): [No change.]

1.3 Subparagraph (b): Amend as follows:

1.3.1 Introductory paragraph: [No change.]

1.3.2 Subparagraph (1): [No change.]

1.3.3 Delete subparagraph (2). Replace with the following: Describe each AECD's general purpose and function. Describe all AECDs in the document you provide including intrusive diagnostics, default actions taken in response to a detected malfunction, and emission control system adaptations.

1.3.4 Subparagraphs (3) through (11): [No change.]

1.4 Subparagraphs (c) through (k): [No change.]

1.5 Delete subparagraph (l). Replace with the following: The engine manufacturer shall identify the emission standards or FELs to which it is certifying engines in the engine family. The engine manufacturer shall identify the ambient operating regions that will apply for NTE testing under Part III: 40 CFR PART 1039, Subpart B, section 1039.101, subparagraph (e)(4).

1.6 Subparagraphs (m) through (v): [No change.]

1.7 Delete subparagraph (w). Replace with the following: The engine manufacturer shall unconditionally certify that all the engines in the engine family comply with the requirements of this part, other referenced parts of the California Code of Regulations and the California Health and Safety Code.

1.8 Delete subparagraph (x). Replace with the following: The engine manufacturer shall include good-faith estimates of U.S.-directed production volumes and California-directed production volumes (separated by California-certified engines and engines that are exempt from California regulation under section 209(e)(1) of the Federal Clean Air Act (42 U.S.C. § 7543(e)(1) but sold in California) in order to determine the California percent of U.S. production. The manufacturer shall include a justification for the estimated production volumes that are substantially different from actual production volumes in earlier years for similar models.

1.9 Delete subparagraph (y). Replace with the following: An engine manufacturer shall include the information required by other subparts, as applicable, of this part and all the information required to demonstrate compliance with title 13, CCR, section 2423.1. For example, an engine manufacturer that participates in the CA-ABT program in title 13, CCR, section 2423.1 shall include the information required by Part III: 40 CFR PART 1039, Subpart H, section 1039.725.

1.10 Subparagraph (z): [No change.]

1.11 Delete subparagraph (aa). Replace with the following: The engine manufacturer shall name an agent for service located in California, or if the engine manufacturer has no California agent, in the United States. Service on this agent constitutes service on the engine manufacturer or any of the engine

manufacturer's officers or employees for any action by CARB or otherwise by the State of California related to the requirements of this part.

1.12 Subparagraph (bb): [No change.]

2. **OR OBD Requirements**.

For off-road compression-ignition engines certified to the Tier 5 final exhaust emission standards in title 13, CCR, section 2423.1, the engine manufacturer shall submit in the application for certification all information required in title 13, CCR, section 2422, in accordance with the provisions therein, and a list that includes all components whose failure would cause the engine's malfunction indicator light to illuminate, as required in Part III: 40 CFR PART 1039, Subpart B, section 1039.120, subparagraph (c).

3. **In-Use Compliance Requirements.**

3.1 For each Tier 5 interim engine family within all power categories and for each Tier 5 final engine family within a power category < 56 kW or > 560 kW a manufacturer shall submit with its application for certification an attestation that the engine family is compliant with all "not-to-exceed" emission limits specified in Part II, Subpart B, section 1 or Part II, Subpart B, section 3, as applicable.

3.2 For each Tier 5 final engine family within a power category 56 ≤ kW ≤ 560 kW, a manufacturer shall submit with its application for certification an attestation that the engine family is compliant with all SOS Emissions In-Use Thresholds specified in Part II, Subpart A, section 3.5.1.2.

§ 1039.210 May I get preliminary approval before I complete my application? September 18, 2007. [No change.]

§ 1039.220 How do I amend my maintenance instructions? October 25, 2016. [No change.]

§ 1039.225 How do I amend my application for certification? October 25, 2016. [No change.]

§ 1039.230 How do I select engine families? October 25, 2016. [No change.]

§ 1039.235 What testing requirements apply for certification? October 25, 2016.

1. Delete introductory paragraph. Replace with the following: This section describes the emission testing the manufacturer shall perform to show compliance with the emission standards in title 13, CCR, section 2423.1. See Part III: 40 CFR PART 1039, section 1039.205, subparagraph (p) regarding emission testing related

to the NTE limits. See Part III: 40 CFR PART 1039, section 1039.205, subsection 3.2 regarding emission testing related to all of the SOS Emissions In-Use Thresholds. See Part III: 40 CFR PART 1039, Subpart C, sections 1039.240 and 1039.245, and Part IV: 40 CFR PART 1065, Subpart E, regarding service accumulation before emission testing.

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

3. Subparagraph (g): Amend as follows:

3.1 Delete introductory paragraph. Replace with the following: Measure CO_2 and CH_4 with each low-hour certification test using the procedures specified in Part IV: 40 CFR PART 1065. Also measure N_2O with each low-hour certification test using the procedures specified in Part IV: 40 CFR PART 1065 for any engine family that depends on NOx aftertreatment to meet emission standards. Small-volume engine manufacturers may omit measurement of N_2O and CH_4. These measurements are not required for NTE testing. Use the same units and modal calculations as for your other results to report a single weighted value for each constituent. Round the final values as follows:

3.2 Subparagraphs (1) through (3): [No change.]

§ 1039.240 How do I demonstrate that my engine family complies with exhaust emission standards? October 25, 2016.

1. Delete subparagraph (a). Replace with the following: For purposes of certification, CARB shall consider an engine family to be in compliance with the emission standards in title 13, CCR, section 2423.1 if all emission-data engines representing that family have test results showing official emission results and deteriorated emission levels at or below these standards. This also applies for all test points for emission-data engines within the family used to establish deterioration factors. Note that FELs shall be the applicable emission standards to which an engine manufacturer shall comply if the engine manufacturer participates in the CA-ABT program in title 13, CCR, section 2423.1, subsection (g) and in Subpart H of this part.

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

3. **California Provisions**

Add the following: For engines designed to discharge crankcase emissions to the ambient atmosphere, you must determine deteriorated emission levels to represent crankcase emissions at the end of useful life for purposes of demonstrating compliance with the SOS Emissions In-Use Thresholds specified in Part II, Subpart A, section 3.5.1.2. Determine a brake-specific crankcase emission result for each pollutant based on operation over the applicable certification cycle. Also determine

the crankcase emission result for NOx in g/hr from the idle portion of any of the duty cycles specified in Part III: 40 CFR PART 1039, Subpart F. Apply crankcase deterioration factors to all these crankcase emission results as described in Part III: 40 CFR PART 1039, Subpart C, § 1039.240, subparagraph (c), then round the adjusted figures to the same number of decimal places as the SOS Emissions In-Use Thresholds specified in Part II, Subpart A, section 3.5.1.2.

§ 1039.245 How do I determine deterioration factors from exhaust durability testing?

1. § 1039.245. January 24, 2023. Amend as follows:

1.1 Introductory paragraph: [No change.]

1.2 Subparagraphs (a) through (d): [No change.]

1.3 Subparagraph (e): Amend as follows:

1.3.1 Introductory paragraph: [No change.]

1.3.2 Subparagraph (1): [No change, except that the minimum required aging for engines is 1,500 hours for engines with a 3,000-hour useful life, 1,750 hours for engines with a 5,000-hour useful life, and 2,800 hours for engines with an 8,000-hour useful life, as defined in title 13, CCR, section 2421.1, subsection (b)(2).]

1.3.3 Subparagraph (2): [No change, except delete the text “rather than 40 CFR 1036.555.”]

1.3.4 Subparagraph (3): [No change, except delete the text “rather than 40 CFR 1036.580.”]

1.4 Add the following: An engine manufacturer shall design its bench aging to represent 8,000 hours of in-use engine operation for every 800 hours of accelerated bench aging.

2. **California Provisions**

2.1 **Verifying deterioration factors**. The provisions in 40 CFR Part 1036, section 1036.246 (January 24, 2023), incorporated by reference herein, shall apply, with the following modifications:

2.1.1 **§ 1036.246 Verifying deterioration factors.** January 24, 2023.

2.1.1.1 Delete introductory paragraph. Replace with the following: CARB may require an engine manufacturer to test in-use engines each calendar year as described in this section to verify that the

deterioration factors the engine manufacturer determined under Part III: 40 CFR PART 1039, Subpart C, section 1039.245 are appropriate.

2.1.1.2 Subparagraph (a): Amend as follows:

2.1.1.2.1 Introductory sentence: [No change.]

2.1.1.2.2 Subparagraphs (1) through (4): [No change.]

2.1.1.2.3 Delete subparagraph (5). Replace with the following: CARB may direct an engine manufacturer to preferentially select certain types of equipment, equipment from certain model years, or equipment within some range of service accumulation. CARB shall not direct an engine manufacturer to select equipment that is 15 or more years old, or equipment with an hour meter reading exceeding 85 percent of the engine's useful life. CARB shall specify a time frame for completing required testing.

2.1.1.3 Subparagraph (b): Amend as follows:

2.1.1.3.1 Introductory sentence: [No change.]

2.1.1.3.2 Subparagraph (1): Amend as follows:

2.1.1.3.2.1 Introductory sentence: [No change.]

2.1.1.3.2.2 Subparagraph (i): [No change.]

2.1.1.3.2.3 Subparagraph (ii): Add the following sentence: For engines using aftertreatment technology with infrequent regeneration, an engine manufacturer shall calculate new adjustment factors in accordance with Part III: 40 CFR PART 1039, Subpart F, section 1039.525 for each engine tested by measuring emissions on all applicable cycles during a regeneration event or when the applicable strategy is active, and by justifying the frequency by either in-use activation data or measuring on the engine dynamometer.

2.1.1.3.2.4 Subparagraph (iii): [No change.]

2.1.1.3.3 Subparagraph (2): [No change.]

2.1.1.4 Subparagraph (c): [No change.]

2.1.1.5 Subparagraph (d): Amend as follows:

2.1.1.5.1 Introductory paragraph: [No change.]

2.1.1.5.2 Subparagraphs (1) through (5): [No change.]

2.1.1.5.3 Delete subparagraph (6). Replace with the following: An engine manufacturer shall state that the tested engines have been properly maintained and used and shall describe all available aspects of each piece of equipment's maintenance history. An engine manufacturer shall also describe the steps it took to prepare the engines for testing.

2.1.1.5.4 Subparagraph (7): [No change.]

2.1.1.6 Subparagraph (e): [No change.]

§ 1039.250 What records must I keep and what reports must I send to EPA? October 25, 2016.

1. Subparagraph (a): Amend as follows:

1.1 Introductory sentence: [No change.]

1.2 Delete subparagraph (1). Replace with the following: Report the total number of engines you produced in each engine family by maximum engine power, total displacement, and the type of fuel system. Break down the total number of engines by U.S.-directed (federal) production volumes and California-directed production volumes. For California-directed volumes, separate the data into California-certified engines and engines that are exempt from California regulation under section 209(e)(1) of the Federal Clean Air Act (42 U.S.C. 7543(e)(1) but sold in California.

1.3 Delete subparagraph (2). Replace with the following: An engine manufacturer that produces exempted engines under the provisions of Part III: 40 CFR PART 1039, Subpart G, § 1039.625, shall follow the reporting requirements in title 13, CCR, section 2423.1, subsection (i)(8).

2. Subparagraph (b):

2.1 Introductory sentence: [No change.]

2.2 Subparagraphs (1) and (2): [No change.]

2.3 Subparagraph (3): [No change.]

2.4 Subparagraph (4): [No change.]

2.5 Delete subparagraph (5). Replace with the following: Engine identification numbers for all the engines you produce under each Executive Order.

3. Subparagraphs (c) and (d): [No change.]

§ 1039.255 What decisions may EPA make regarding a certificate of conformity? June 29, 2021.

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

2. Delete subparagraph (b). Replace with the following: CARB may deny the engine manufacturer's application for certification if CARB determines that an engine manufacturer's engine family fails to comply with emission standards or other requirements of this part or the California Health and Safety Code, Division 26, and corresponding regulations, as applicable. CARB's decision shall be based on all available information. If CARB denies an engine manufacturer's application for certification, CARB shall explain why in writing.

3. Subparagraph (c): [No change.]

4. Delete subparagraph (d). Replace with the following: A violation of the requirements of this section is a violation of the applicable provisions of the California Health and Safety Code, Division 26, and corresponding regulations, and is subject to the penalty provisions thereunder.

5. Subparagraphs (e) and (f): [No change.]

Subpart D – [Reserved]

Subpart E – In-use Testing

§ 1039.401 General Provisions. June 29, 2004. [n/a]

Replace with the following: CARB may perform in-use testing of any engine subject to the standards in title 13, CCR, section 2423.1 in accordance with Part II of these test procedures. However, CARB shall limit recall testing to the first 75 percent of each engine's useful life as specified in title 13, CCR, section 2421.1.

Subpart F – Test Procedures

§ 1039.501 How do I run a valid emission test? January 24, 2023. [No change.]

§ 1039.505 How do I test engines using steady-state duty cycles, including ramped-modal testing? October 25, 2016. [No change.]

§ 1039.510 Which duty cycles do I use for transient testing? April 28, 2014. [No change.]

§ 1039.515 What are the test procedures related to not-to-exceed limits? October 25, 2016. [No change.]

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

§ 1039.520 What testing must I perform to establish deterioration factors? June 29, 2004. [No change.]

§ 1039.525 How do I adjust emission levels to account for infrequently regenerating aftertreatment devices? October 25, 2016. [No change.]

Subpart G – Special Compliance Provisions

§ 1039.601 What compliance provisions apply? June 29, 2021. [No change.]

§ 1039.605 What provisions apply to engines certified under the motor-vehicle program? October 25, 2016.

1. Delete subparagraph (a). Replace with the following: ***General provisions.*** This section allows an engine manufacturer to introduce new off-road engines into commerce if they are already certified to the requirements that apply to compression-ignition engines under title 13, CCR, section 1956.8 for the appropriate model year. If an engine manufacturer complies with all the provisions of this section, CARB shall consider the Executive Order issued under title 13, CCR, section 1956.8 for each engine to also be a valid Executive Order under title 13, CCR, section 2423.1 for its model year, without a separate application for certification under the requirements of title 13, CCR, section 2423.1.

2. Subparagraphs (b) and (c): [No change, except that the references to "40 CFR part 85" and "40 CFR part 86" shall mean "title 13, CCR, section 1956.8."]

3. Subparagraph (d): Amend as follows:

3.1 Introductory paragraph: [No change.]

3.2 Delete subparagraph (1). Replace with the following: The engine manufacturer's engine shall be covered by a valid Executive Order issued under title 13, CCR, section 1956.8.

3.3 Subparagraph (2): [No change.]

3.4 Subparagraph (3): Amend as follows:

3.4.1 Delete introductory paragraph. Replace with the following: The engine manufacturer shall show that fewer than 50 percent of the engine family's total sales in California are used in off-road applications. This includes engines used in any application without regard to which company manufactures the vehicle or equipment. Engines that fall within the scope of the preemption of Section 209(E)(1) of the Federal Clean Air Act (42 U.S.C. 7543(e)(1)) and as defined by regulation of the U.S. Environmental Protection

Agency shall not be included in the calculation of this percentage. Show this as follows:

3.4.2 Subparagraphs (i) and (ii): [No change.]

3.5 Delete subparagraph (4). Replace with the following: The engine manufacturer shall ensure that the engine has the label required under Part I, section 35 of the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles," incorporated by reference in title 13, CCR, section 1956.8, subsection (b).

3.6 Subparagraph (5): Amend as follows:

3.6.1 Introductory paragraph: [No change.]

3.6.2 Delete subparagraph (i). Replace with the following: Include the heading: "OFF-ROAD ENGINE EMISSION CONTROL INFORMATION."

3.6.3 Subparagraph (ii): [No change.]

3.6.4 Delete subparagraph (iii). Replace with the following: State: "THIS ENGINE WAS ADAPTED FOR OFF-ROAD USE WITHOUT AFFECTING ITS EMISSION CONTROLS. THE EMISSION-CONTROL SYSTEM DEPENDS ON THE USE OF FUEL MEETING SPECIFICATIONS THAT APPLY FOR MOTOR-VEHICLE APPLICATIONS. OPERATING THE ENGINE ON OTHER FUELS MAY BE A VIOLATION OF CALIFORNIA LAW." The referencing of similar federal requirements under this provision is permitted.

3.6.5 Subparagraph (iv): [No change.]

3.7 Subparagraphs (6) through (8): [No change.]

4. Subparagraphs (e) and (f): [No change.]

5. Delete subparagraph (g). Replace with the following: ***Participation in averaging, banking and trading.*** Engines adapted for off-road use under this section shall not generate or use CA-ABT emission credits under Part III: 40 CFR PART 1039, Subpart H.

§ 1039.610 What provisions apply to vehicles certified under the motor-vehicle program? October 25, 2016. [n/a]

§ 1039.615 What special provisions apply to engines using noncommercial fuels? June 29, 2004.

1. Introductory paragraph: [No change.]

2. Subparagraph (a): [No change.]

3. Subparagraph (b): Amend as follows:

3.1 Introductory sentence: [No change.]

3.2 Subparagraph (1): [No change.]

3.3 Subparagraph (2): Amend as follows:

3.3.1 Introductory sentence: [No change.]

3.3.2 Subparagraph (i): [No change.]

3.3.3 Delete subparagraph (ii). Replace with the following: State: "THIS ENGINE IS CERTIFIED TO OPERATE IN APPLICATIONS USING NONCOMMERCIAL FUEL. MALADJUSTMENT OF THE ENGINE IS A VIOLATION OF CALIFORNIA LAW SUBJECT TO CIVIL PENALTY."

3.4 Subparagraph (3): [No change.]

§ 1039.620 What are the provisions for exempting engines used solely for competition? June 29, 2021. [No change.]

§ 1039.625 What requirements apply under the program for equipment-manufacturer flexibility? June 29, 2021. [n/a]

Replace with the following: In accordance with the California Transition Program for Equipment Manufacturers provisions in title 13, CCR, section 2423.1, subsection (i), equipment manufacturers may produce equipment with engines that are subject to less stringent emission standards after the Tier 5 final emission standards begin to apply. However, in doing so, engine manufacturers shall comply with the requirements of the California Transition Program for Equipment Manufacturers.

§ 1039.626 What special provisions apply to equipment imported under the equipment-manufacturer flexibility program? June 29, 2004.

[No change, except references to "§ 1039.625" shall mean "title 13, CCR, section 2423.1, subsection (i)."]

§ 1039.627 What are the incentives for equipment manufacturers to use cleaner engines? April 30, 2010. [n/a]

§ 1039.630 What are the economic hardship provisions for equipment manufacturers? June 29, 2004. [No change.]

§ 1039.635 What are the hardship provisions for engine manufacturers? June 29, 2004. [No change.]

§ 1039.645 What special provisions apply to engines used for transportation refrigeration units? June 30, 2008. [No change.]

§ 1039.650 [Reserved]

§ 1039.655 What special provisions apply to engines sold in American Samoa or the Commonwealth of the Northern Mariana Islands? January 24, 2023. [n/a]

§ 1039.665 Special provisions for use of engines in emergency situations. August 8, 2014. [No change.]

§ 1039.670 Approval of an emergency equipment field modification (EEFM). August 8, 2014. [No change.]

§ 1039.699 Emission standards and certification requirements for auxiliary power units for highway tractors. October 25, 2016.

1. Delete subparagraph (a). Replace with the following: This section specifies the emission standards and certification requirements for 2031 and subsequent model year auxiliary power units (APU) installed on tractors subject to greenhouse gas exhaust emission standards specified in title 17, CCR, section 95663, subsection (a)(2)(B).

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

3. Delete subparagraph (c). Replace with the following: PM exhaust emissions shall not exceed a standard of 0.02 g/kW-hr or the applicable Tier 5 final PM standard in title 13, CCR, section 2423.1, subsection (d)(1)(A), whichever is more stringent. NMHC, NOx, and CO exhaust emissions shall not exceed the applicable standards in title 13, CCR, section 2423.1. An engine manufacturer shall demonstrate compliance with these emission standards by testing its engines using the steady-state test procedures described in Part III: 40 CFR PART 1039, Appendix II to Part 1039 for the duty-cycles specified in Part III: 40 CFR PART 1039, Subpart F, section 1039.505, subparagraph (b)(1) of these test procedures. APUs shall meet the exhaust emission standards of this section over the engine's useful life as specified in title 13, CCR, section 2421.1, subsection (b)(2). These emission standards also apply for testing with production and in-use APUs.

4. Delete subparagraph (d). Replace with the following: An APU that is equipped with an engine that has been certified under title 13, CCR, section 2423.1 with a PM family emission limit of 0.02 g/kW-hr or below shall be deemed to have a valid Executive Order under this section.

5. Subparagraphs (e) through (f): [No change.]

6. Delete subparagraph (g). Replace with the following: An APU manufacturer may group all of its APUs into a single emission family; however, the APU manufacturer shall subdivide its APUs into multiple emission subfamilies using the same criteria for grouping engine families described in Part III: 40 CFR PART 1039, Subpart C, section 1039.230 of these test procedures.

7. Subparagraph (h): [No change.]

8. Delete subparagraph (i). Replace with the following: An APU Executive Order is valid for any engine certified under title 13, CCR, section 2423.1 as long as the engine has been certified to a family PM emission limit of 0.02 g/kW-hr or less and has a maximum engine power rating no more than 10 percent greater than the maximum engine power of the engine used for certification testing under this section.

9. Subparagraph (j): [No change.]

10. Subparagraph (k): Amend as follows:

10.1 Delete the introductory paragraph. Replace with the following: At the time of manufacture, an APU manufacturer shall affix a permanent and legible label identifying each APU. This applies even if the engine manufacturer certifies a compliant engine as described in subparagraph (d) of this section. The label shall meet the specifications described in title 13, CCR, section 2424.1 and in Part V: 40 CFR PART 1068, Subpart A, section 1068.45, subparagraph (a) of these test procedures. Additionally, the label shall:

10.2 Subparagraphs (1) and (2): [No change.]

10.3 Delete subparagraph (3). Replace with the following: State: “THIS APU ENGINE COMPLIES WITH 13 CCR § 2423.1(o).”

11. Subparagraph (l): [No change.]

12. Subparagraph (m): Amend as follows:

12.1 Delete introductory paragraph. Replace with the following: See Part III: 40 CFR PART 1039, Subpart C, sections 1039.201, 1039.210, 1039.220, 1039.225, 1039.250, and 1039.255 for general requirements related to obtaining an Executive Order. An APU manufacturer shall include the following information

in its application for certification, unless CARB asks the APU manufacturer to include less information:

12.2 Subparagraphs (1) through (5): [No change.]

12.3 Delete subparagraph (6). Replace with the following: The APU manufacturer shall list the specifications of the test fuel to show that it falls within the required ranges CARB specifies in Part IV: 40 CFR PART 1065, Subpart B of these test procedures.

12.4 Subparagraphs (7) through (11): [No change.]

12.5 Delete subparagraph (12). Replace with the following: The APU manufacturer shall report all test results, including those from invalid tests, whether or not they were conducted according to the test procedures of subpart F of this part. CARB may ask an APU manufacturer to send other information to confirm that the engine manufacturer's tests were valid under the requirements of Part III: 40 CFR PART 1039 and Part IV: 40 CFR PART 1065 of these test procedures. The APU manufacturer shall submit to CARB any additional information requested by CARB within 45 calendar days from the date the request is made by CARB.

12.6 Subparagraph (13): [No change.]

12.7 Delete subparagraph (14). Replace with the following: Unconditionally certify that all the APUs in the emission family comply with the requirements of this part and title 13, CCR, sections 2420.1, 2421.1, 2422, 2423.1, 2424.1, 2425.2, 2425.3, 2425.4, 2426, 2427.1, and 2430.1.

12.8 Subparagraphs (15) and (16): [No change.]

13. Delete subparagraph (n). Replace with the following: If a tractor manufacturer installs an APU from an APU manufacturer that is not properly certified and labeled, the APU manufacturer is presumed to have caused the violation (see Part V: 40 CFR PART 1068, Subpart B, section 1068.101, subparagraph (c)).

Subpart H – Averaging, Banking, and Trading for Certification

§ 1039.701 General provisions. October 25, 2016.

1. Delete subparagraph (a). Replace with the following:

1.1 References to "ABT" in this subpart shall mean "CA-ABT," unless otherwise noted.

1.2 Beginning with 2033 model year engines, a manufacturer may generate CA-ABT emission credits from engine families with a power rating

greater than 130 kW that certify to the Tier 5 final NOx and PM criteria pollutant exhaust emission standards in title 13, CCR, section 2423.1, subsection (d)(1) and the Tier 5 final Low-Load Cycle NOx and PM exhaust emission standards in title 13, CCR, section 2423.1, subsection (d)(2)(A). Participation in this program is voluntary.

1.3 All CA-ABT calculations shall be performed using California sales volumes.

1.4 CA-ABT credits may not be generated from the production or sales of zero-emission off-road equipment.

1.5 CA-ABT credits shall not be generated for engines and equipment that fall within the scope of the preemption of Section 209(e)(1) of the Federal Clean Air Act (42 U.S.C. 7543(e)(1)) and as defined by regulation of the United States Environmental Protection Agency.

1.6 A manufacturer shall not generate CA-ABT credits for the production or sale of Tier 5 interim engines or Tier 4 final engines.

1.7 An engine manufacturer that chooses to participate in the CA-ABT program for one model year to generate credits is not required to participate in the CA-ABT program in subsequent model years. Any CA-ABT credits that are generated by a manufacturer in a model year may be banked by the manufacturer, even if it does not participate in the CA-ABT program in subsequent model years.

1.8 Manufacturers may not generate CA-ABT credits from engine families with a power rating less than 130 kilowatts. Engine manufacturers may use banked CA-ABT credits to certify engine families of any power rating including those less than 130 kilowatts.

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

3. Subparagraph (c): Amend as follows:

3.1 Subparagraphs (1) through (6): [No change.]

3.2 Delete subparagraph (7). Replace with the following: ***Standard*** means the emission standard that applies under title 13, CCR, sections 2423 or 2423.1, as applicable, for engines not participating in the CA-ABT program of this subpart.

3.3 Subparagraph (8): [No change.]

4. Subparagraphs (d) and (e): [No change.]

5. Delete subparagraph (f). Replace with the following:

5.1 CA-ABT emission credits generated in the 2033 through 2035 model years shall only be used in the 2036 and subsequent model years.

5.2 Emission credits generated in the 2036 and subsequent model years may be used in the model year they are generated or in subsequent model years in accordance with the requirements in Part III: 40 CFR PART 1039, Subpart H, section 1039.740.

5.3 Emission credits shall not be used for previous model years, except as allowed under Part III: 40 CFR PART 1039, Subpart H, section 1039.745, subsection 1.1.

6. Subparagraphs (g) and (h): [No change.]

§ 1039.705 How do I generate and calculate emission credits? April 22, 2024.

1. Delete introductory paragraph. Replace with the following: The provisions of this section apply separately for calculating emission credits for NOx or PM. Emission credits may not be generated or used for engines or equipment that fall within the scope of the preemption of Section 209(e)(1) of the Federal Clean Air Act (42 U.S.C. 7543(e)(1)), and as defined by regulation of the United States Environmental Protection Agency.

2. Subparagraph (a): [No change.]

3. Delete subparagraph (b). Replace with the following:

3.1 **Tier 5 Criteria Pollutants**

3.1.1 **Calculation of CA-ABT Criteria Pollutant Credits**

3.1.1.1 For engine families that are ≤ 560 kW that certify to the Tier 5 final NOx and PM criteria pollutant exhaust emission standards in title 13, CCR, section 2423.1, subsection (d)(1) other than constant-speed engine families, a manufacturer may calculate positive or negative CA-ABT credits based on the FEL and the standard for the NRTC, separated out by model year. The FEL for a steady-state duty cycle and OR-LLC are calculated from the FEL for the NRTC as described in title 13, CCR, section 2423.1, subsection (d)(1)(B)4.

3.1.1.2 For constant-speed engine families that are ≤ 560 kW and all engine families that are > 560 kW that certify to the Tier 5 final NOx and PM criteria pollutant exhaust emission standards in title 13, CCR, section 2423.1, subsection (d)(1), a manufacturer shall calculate positive

or negative CA-ABT credits based on the FEL and the standard for the steady-state duty cycle, separated out by model year.

3.1.1.3 CA-ABT emission credits shall not be calculated based on the FEL and the Tier 5 final OR-LLC NOx and PM exhaust emission standards in title 13, CCR, section 2423.1, subsection (d)(2)(A).

3.1.1.4 CA-ABT emission credits shall not apply to Idle NOx emission standards in title 13, CCR, section 2423.1, subsection (d)(3)(A).

3.1.2 **Tier 5 Criteria Pollutant CA-ABT Credit Equation**

Engine manufacturers shall calculate Tier 5 Criteria Pollutant CA-ABT credits as follows. For each participating engine family, calculate positive or negative emission credits for NOx and PM relative to the applicable NOx and PM emission standard, separated out by model year. Calculate positive emission credits for an engine family that has an FEL that is below the applicable Tier 5 final standard. Calculate negative emission credits for an engine family that has an FEL that is above the applicable Tier 5 final standard to which an engine family is certified. Sum your positive and negative credits for the model year before rounding. Round the sum of emission credits to the nearest kilogram (kg), using consistent units throughout the following equation in accordance with the rounding conventions in Part IV: 40 CFR PART 1065, Subpart A, section 1065.20. For power categories < 19 kW, the NOx emission credit shall be calculated using the applicable NMHC+NOx FEL in the following equation and then multiplying the result by 0.80.

$$\textit{Emission credits (kg)} = (Mult) * (Std - FEL) * (Volume) * (AvgPR) * (UL) * (10^{-3})$$

Where:

kg	=	kilogram
Mult	=	Applicable early introduction credit multiplier in subsection 3.2 of this section 1039.705
Std	=	The Tier 5 final emission standard, grams per kilowatt-hour, that applies under title 13, CCR, section 2423.1
FEL	=	The family emission limit for the engine family, in grams per kilowatt-hour shown in subsection 5.1 of this section 1039.705
Volume	=	Actual California-directed end-of-model year production volumes of engines in the engine family
AvgPR	=	The average value of maximum engine power values for the engine configurations within an engine family, calculated on a sales-weighted basis, in kilowatts
UL	=	The useful life for the given engine family, in hours

3.2 **Early Introduction Credit Multipliers**

3.2.1 An engine manufacturer that voluntarily certifies engines to the Tier 5 final standards in title 13, CCR, section 2423.1, subsections (d)(1) and (d)(2) prior to the 2036 model year may generate additional CA-ABT credits using the applicable NOx Early Introduction Credit Multiplier set forth as follows. The Early Introduction Credit Multipliers in subsections 3.2.1.1 through 3.2.1.3 only apply for calculation of positive credits. Early Introduction Credit Multipliers shall equal one for the calculation of negative credits.

3.2.1.1 If a manufacturer certifies an engine family to Tier 5 final standards in the 2035 model year, the NOx Early Introduction Credit Multiplier equals 1.25.

3.2.1.2 If a manufacturer certifies an engine family to Tier 5 final standards in the 2034 model year, the NOx Early Introduction Credit Multiplier equals 1.50.

3.2.1.3 If a manufacturer certifies an engine family to Tier 5 final standards in the 2033 model year, the NOx Early Introduction Credit Multiplier equals 1.75.

3.2.2 For PM emissions, the Early Introduction Credit Multiplier equals one for all model years for the calculation of both positive and negative credits.

4. Subparagraph (c): [No change.]

5. **California Provisions**

5.1 **Criteria Pollutant Family Emission Limits for the NRTC and Steady-State Duty Cycles**

The manufacturer shall set an FEL, as applicable, for Tier 5 final engines not to exceed the levels contained in the following tables.

5.1.1 The following FEL caps apply to off-road compression-ignition engines in the power categories < 19 kW.

Test Cycle	NOx FEL (g/kW-hr)	PM FEL (g/kW-hr)
NRTC[1]	6.0	0.40[2]
RMC or Discrete-Mode Cycle	6.0	0.40[2]

[1] The "NRTC" values apply to engine families that are certified to the Tier 5 final NOx and PM criteria pollutant exhaust emission standards in title 13, CCR, section 2423.1, subsection (d)(1).

[2] The Tier 5 final upper limit FEL for hand-startable, air-cooled, direct injection engines below 8 kW is 0.60 g/kW-hr.

5.1.2 The following FEL caps apply to off-road compression-ignition engines in the power category 19 ≤ kW < 56.

Test Cycle	NOx FEL (g/kW-hr)	PM FEL (g/kW-hr)
NRTC[1]	3.8	0.03
RMC or Discrete-Mode Cycle	3.8	0.03

[1] The "NRTC" values apply to engine families that are certified to the Tier 5 final NOx and PM criteria pollutant exhaust emission standards in title 13, CCR, section 2423.1, subsection (d)(1).

5.1.3 The following FEL caps apply to off-road compression-ignition engines in the power category 56 ≤ kW < 130.

Test Cycle	NOx FEL (g/kW-hr)	PM FEL (g/kW-hr)
NRTC[1]	0.40	0.02
RMC or Discrete-Mode Cycle	0.40	0.02

[1] The "NRTC" values apply to engine families that are certified to the Tier 5 final NOx and PM criteria pollutant exhaust emission standards in title 13, CCR, section 2423.1, subsection (d)(1).

5.1.4 The following FEL caps apply to off-road compression-ignition engines in the power category 130 ≤ kW ≤ 560.

Test Cycle	NOx FEL (g/kW-hr)	PM FEL (g/kW-hr)
NRTC[1]	0.40	0.02
RMC or Discrete-Mode Cycle	0.40	0.02

[1] The "NRTC" values apply to engine families that are certified to the Tier 5 final NOx and PM criteria pollutant exhaust emission standards in title 13, CCR, section 2423.1, subsection (d)(1).

5.1.5 The following FEL caps apply to off-road compression-ignition generator engines in the power category kW > 560.

Test Cycle	NOx FEL (g/kW-hr)	PM FEL (g/kW-hr)
RMC or Discrete-Mode Cycle[1]	0.67	0.03

[1] The "RMC or Discrete-Mode Cycle" values apply to engine families that are certified to the Tier 5 final NOx and PM criteria pollutant exhaust emission standards in title 13, CCR, section 2423.1, subsection (d)(1).

5.1.6 The following FEL caps apply to off-road compression-ignition engines other than generator engines in the power category kW > 560.

Test Cycle	NOx FEL (g/kW-hr)	PM FEL (g/kW-hr)
RMC or Discrete-Mode Cycle[1]	3.5	0.04

[1] The "RMC or Discrete-Mode Cycle" values apply to engine families that are certified to the Tier 5 final NOx and PM criteria pollutant exhaust emission standards in title 13, CCR, section 2423.1, subsection (d)(1).

5.2 **ABT Credit Transfer from Federal ABT Program**.

5.2.1 An engine manufacturer may transfer a portion of its existing federal Tier 4 ABT credit balance earned through December 31, 2035, into the CA-ABT program in accordance with this section 5.2. An engine manufacturer that elects to transfer existing federal Tier 4 ABT credits into the CA-ABT bank must report the transfer of these credits in accordance with the reporting requirements in Part III: 40 CFR PART 1039, Subpart H, section 1039.730, subparagraph (a). A manufacturer may not transfer any federal ABT credits into the CA-ABT program except for this one-time transfer of credits.

5.2.2 An engine manufacturer that elects to transfer a portion of its existing federal Tier 4 ABT credit balance into the CA-ABT program shall comply with the reporting requirements in Part III: 40 CFR PART 1039, Subpart H, section 1039.730, subsection 1.1.

5.2.3 The maximum allowable number of federal ABT NOx and PM credits that may be transferred into the CA-ABT program shall be calculated based on the average percentage of total national sales for engines within each power category that are produced and delivered for sale in California during the 2031 through 2035 model years.

5.2.4 **Allowable Transfer of Federal ABT NOx Credits.**

5.2.4.1 For each power category, an engine manufacturer shall calculate the maximum number of federal ABT NOx credits that may be attributed to engines that were sold in California in accordance with Part III: 40 CFR PART 1039, Subpart H, section 1039.705, subsections 5.2.4.1.1 and 5.2.4.1.2.

5.2.4.1.1 For each power category ≥ 56 kW specified in title 13, CCR, section 2423, subsection (b)(1)(B), the maximum allowable federal ABT NOx credits that may be attributed to engines that were sold in California is equal to the total number of federal Tier 4 ABT NOx credits owned by the manufacturer on December 31, 2035, for that power category, multiplied by the average percentage of total national sales for engines within that power category that are produced and delivered for sale in California during the 2031 through 2035 model years.

5.2.4.1.2 For each power category < 56 kW specified in title 13, CCR, section 2423, subsection (b)(1)(B), the maximum allowable federal ABT NOx credits that may be attributed to engines that were sold in California is equal to 80 percent of the total number of federal Tier 4 ABT NMHC+NOx credits owned by the manufacturer on December 31, 2035, for that power category, multiplied by the average percentage of total national sales for engines within that power category that are produced and delivered for sale in California during the 2031 through 2035 model years.

5.2.4.2 The total number of federal ABT NOx credits that may be attributed to engines that were sold in California shall be determined by adding the maximum allowable federal ABT NOx credits from all power categories, as determined in accordance with Part III: 40 CFR PART 1039, Subpart H, section 1039.705, subsections 5.2.4.1.1 and 5.2.4.1.2.

5.2.4.3 The total number of NOx credits that may be transferred from the federal ABT NOx bank to the CA-ABT NOx bank shall be calculated by multiplying the total number of federal ABT NOx credits that may be attributed to engines that were sold in California by 30 percent to compensate for the significant difference between engines complying with Tier 5 final requirements and engines that generated federal ABT NOx credits.

5.2.5 **Allowable Transfer of Federal ABT PM Credits.**

5.2.5.1 For each power category specified in title 13, CCR, section 2423, subsection (b)(1)(B), an engine manufacturer shall calculate the maximum allowable federal ABT PM credits that may be attributed to engines that were sold in California by multiplying the total number of federal Tier 4 ABT PM credits owned by the manufacturer on December 31, 2035, for that power category, by the average percentage of total national sales for engines within that power category that are produced and delivered for sale in California during the 2031 through 2035 model years.

5.2.5.2 The total number of federal ABT PM credits that may be attributed to engines that were sold in California shall be determined by adding the maximum allowable federal ABT PM credits from all power categories, as determined in accordance with Part III: 40 CFR PART 1039, Subpart H, section 1039.705, subsection 5.2.5.1.

5.2.5.3 The total number of federal ABT PM credits that may be transferred from the federal ABT PM bank to the CA-ABT PM bank shall be calculated by multiplying the total number of federal ABT PM credits that may be attributed to engines that were sold in California by 30 percent to compensate for the significant difference between engines complying with Tier 5 final requirements and engines that generated federal ABT PM credits.

5.2.6 Federally transferred credits generated by Tier 4 engines may be used in California under the same limitations set forth in Part III: 40 CFR PART 1039, Subpart H, section 1039.740, subsection 6.

5.3 **Credit Banks**

5.3.1 Separate CA-ABT credit banks shall be created for NOx and PM emissions.

5.3.2 An engine manufacturer shall calculate positive and negative credits for each specified pollutant for each power category. Calculations and

credit balances shall be shown separately for each pollutant and itemized by credit type, i.e., 1) federally transferred Tier 4 credits, 2) early introduction Tier 5 final credits, and 3) credits generated during the Tier 5 final timeframe.

5.3.3 The total number of credits within a credit bank for each pollutant shall equal the sum of the CA-ABT credits for the applicable pollutant across all power categories.

5.3.4 For each pollutant, credits within the corresponding credit bank may be used to offset emissions of the same pollutant from any power category.

§ 1039.710 How do I average emission credits? October 25, 2016. [No change.]

§ 1039.715 How do I bank emission credits? April 30, 2010. [No change.]

§ 1039.720 How do I trade emission credits? April 30, 2010. [No change.]

§ 1039.725 What must I include in my application for certification? October 25, 2016. [No change, except that "ABT" shall mean "CA-ABT."]

§ 1039.730 What ABT reports must I send to EPA? October 25, 2016. [No change, except that references to "U.S.-directed production volumes" shall mean "U.S.-directed production volumes and California-directed production volumes."]

1. **California Provisions**

1.1 **Reporting of Credit Transfer from Federal ABT Program**

1.1.1 An engine manufacturer that elects to transfer a portion of its federal ABT credits into the CA-ABT program shall submit a report to CARB in accordance with the deadlines specified in subparagraph (a) that shows what the manufacturer's federal Tier 4 credit balance is through December 31, 2035.

1.1.2 The engine manufacturer shall include in the report its calculations to determine the maximum allowable federal ABT credits that may be transferred into the CA-ABT credits, based on the requirements in Part III: 40 CFR PART 1039, Subpart H, section 1039.705, subsection 5.4. The engine manufacturer shall also report the actual number of credits transferred even if different from the maximum allowable federal ABT credits that can be transferred.

§ 1039.735 What records must I keep? October 25, 2016.

1. Subparagraphs (a) through (c): [No change.]

2. Delete subparagraph (d). Replace with the following: An engine manufacturer shall keep records of the engine identification number or other unique identification such as the engine serial number for each engine it produces that generates or uses emission credits under the CA-ABT program. The engine manufacturer may identify these numbers as a range. If an engine manufacturer changes the FEL after the start of production, it shall identify the date it started using each FEL and the range of engine identification numbers or unique identification associated with each FEL. An engine manufacturer shall also identify the purchaser and destination for each engine it produces to the extent this information is available.

3. Subparagraph (e): [No change.]

§ 1039.740 What restrictions apply for using emission credits? June 29, 2021.

1. Introductory sentence: [No change.]

2. Delete subparagraph (a). Replace with the following: ***Averaging sets.*** Emission credits may be exchanged only within an averaging set. For emission credits generated by Tier 5 final engines, there is one averaging set.

3. Subparagraph (b): [n/a]

4. Delete subparagraph (c). Replace with the following: *NOx and NOx + NMHC emission credits*. An engine manufacturer may use NOx emission credits without adjustment to show compliance with NOx + NMHC standards. An engine manufacturer may not use NOx + NMHC emission credits to show compliance with NOx standards.

5. Subparagraph (d): [No change.]

6. **California Provisions**

6.1 **Use of CA-ABT Criteria Pollutant Credits**

6.1.1 An engine manufacturer may not use credits generated from Tier 5 final engine families to comply with any criteria pollutant exhaust emission standards in title 13, CCR, section 2423.1 prior to the 2036 model year.

6.1.2 In the 2036 and subsequent model years, an engine manufacturer may use CA-ABT criteria pollutant emission credits from engine families that certify to the Tier 5 final NOx and PM criteria pollutant exhaust

emission standards in title 13, CCR, section 2423.1, subsection (d)(1) and the Tier 5 final Low-Load Cycle NOx and PM exhaust emission standards in title 13, CCR, section 2423.1, subsection (d)(2)(A).

6.1.3 Under the limited production provisions of title 13, CCR, section 2423.1, subsection (e)(1)(C), a manufacturer that sells engines that are certified to Tier 4 final emission standards or Tier 5 interim emission standards, which shall be limited to a combined total production of 5 percent, must offset their emissions using CA-ABT credits as follows:

6.1.3.1 **Limited Production Carryover Provision for Tier 4 Final and Tier 5 Interim Engines**

6.1.3.1.1 The value of CA-ABT criteria pollutant emission credits shall be discounted by 70 percent to compensate for the otherwise mandatory Tier 5 final elements that are absent from the carryover engine family. These elements include longer useful life, longer warranty, enhanced defects reporting, compliance with OR-LLC standards, compliance with idle reduction standards, in-use testing readiness, and OR OBD/REAL standardization and monitoring capability.

6.1.3.1.2 The required amount of CA-ABT credits for carrying over Tier 4 final and Tier 5 interim engines shall match the credit deficit calculated by the CA-ABT equation specified in section 1039.705 divided by 30 percent due to the 70 percent discount factor. The table in the following section 6.3.2.1.3 shows the minimum FEL values for NOx or NOx + NMHC values for limited production of Tier 4 final and Tier 5 interim carryover engines. There is no minimum FEL value for PM for limited production of Tier 4 final and Tier 5 interim carryover engines.

6.1.3.1.3 Minimum FEL values for limited production of Tier 4 Final and Tier 5 Interim Engines

	Minimum NOx + NMHC FEL (g/kW-hr) for limited production of Tier 4 final and Tier 5 interim engines	Minimum NOx FEL (g/kW-hr) for limited production of Tier 4 final and Tier 5 interim engines
kW < 8	7.2	n/a
8 ≤ kW < 19	7.2	n/a
19 ≤ kW < 56	N/A	3.8
56 ≤ kW < 130	N/A	0.25
130 ≤ kW ≤ 560	N/A	0.20
> 560 kW (GEN)	N/A	0.67
> 560 kW (ELSE)	N/A	3.2

6.1.3.1.4 Tier 4 Final Carryover Example

The following example shows how an engine manufacturer shall calculate CA-ABT credits to offset emissions from “carryover” engines that are certified to Tier 4 final emission standards under the limited production provisions of title 13, CCR, section 2423.1, subsection (e)(1)(C).

6.1.3.1.4.1 Example Scenario

- Tier 4 final carryover engine was certified to 0.25 g/kW-hr NOx FEL (T4f FEL) with the maximum engine power 200 kW
- Tier 5 final NOx standard (T5f STD) is 0.040 g/kW-hr
- 100 units in the engine family
- Useful life is 8,000 hours
- 70% credit discount factor

6.1.3.1.4.2 CA-ABT Credit Example Calculation

CA-ABT Credits Needed (kg) = (T5f STD – T4f FEL) x (Sales Volume) x (Useful Life) x (Max Power) x 0.001 / (1 – 0.7)

CA-ABT Credits Needed (kg) = (0.040 – 0.25) x (100) x (8,000) x (200) x (0.001) / (1 – 0.7) = -112,000 kg

6.1.4 A manufacturer may transfer a portion of its existing federal Tier 4 ABT credit balance earned through December 31, 2035, into the CA-ABT program in accordance with Part III: 40 CFR Part 1039, Subpart H, section 1039.701, subsection 7.1. A manufacturer may not transfer any

federal ABT credits into the CA-ABT program except for this one-time transfer of credits.

6.2 **CA-ABT Credit Life**

6.2.1 Credits generated during the 2033 through 2035 model years shall be treated as if they were generated during the 2036 model year for the purpose of calculating credit life. Federal ABT credits that are transferred into the CA-ABT program shall also be treated as if they were generated during the 2036 model year for the purpose of calculating credit life.

6.2.2 Emission credits shall retain full value through five model years. Credits will have no value if not used by the beginning of the sixth model year. Implementation of this provision is as follows:

6.2.2.1 The first model year of the credit expiration 5-year clock is the first model year in which credits are used in 2036 or subsequent model years.

6.2.2.2 For example, if CA-ABT credits that are generated during the 2033 through 2035 model years for early compliance Tier 5 final engines are first used in model year 2037, the credits would retain full value in model years 2037 through 2041 and retain no value in model year 2042 or later.

6.2.2.3 If CA-ABT credits are generated in model year 2036 and first used in model year 2037, the credits would also retain full value through model year 2041 and retain no value in model year 2042 or later.

§ 1039.745 What can happen if I do not comply with the provisions of this subpart?

1. § 1039.745. June 29, 2004. [No change.]

2. **California Provisions**

2.1 **Procedure for Offsetting Negative Emission Credits**

2.1.1 A manufacturer shall equalize negative emission credits by generating kilogram NOx or PM positive emission credits in an amount equal to the kilogram NOx or PM negative emission credits or by submitting a commensurate amount of kilogram NOx or PM positive credits to CARB that were generated previously or acquired from another manufacturer. A manufacturer shall equalize all negative credits by the end of the following model year. If negative emission credits are not equalized within the specified

time period, the manufacturer shall be subject to the same civil penalties applicable to a manufacturer that sells a new engine that does not meet the applicable emission standards adopted by the state board. Civil penalties for California may be assessed for each engine in violation under the requirements of the California Health and Safety Code, Division 26, and corresponding regulations. The cause of action shall be deemed to accrue when the negative emission credits are not equalized by the end of the specified time period.

2.1.2 A manufacturer may be subject to additional penalties under the Health and Safety Code for any other violation of this section other than the failure to equalize negative emission credits within the specified time period under this subsection.

Subpart I – Definitions and Other Reference Information

§ 1039.801 What definitions apply to this part? January 24, 2023. [No change.]

§ 1039.805 What symbols, acronyms, and abbreviations does this part use? June 8, 2012. [No change.]

§ 1039.815 What provisions apply to confidential information? October 25, 2016. [No change.]

§ 1039.820 How do I request a hearing? June 29, 2004. [No change.]

§ 1039.825 What reporting and recordkeeping requirements apply under this part? October 25, 2016. [No change.]

Appendix I to Part 1039 – Summary of Previous Emission Standards. January 24, 2023. [n/a]

Appendix II to Part 1039 – Steady-State Duty Cycles. June 30, 2008. [No change.]

Appendixes III-V to Part 1039 – [Reserved].

Appendix VI to Part 1039 – Nonroad Compression-Ignition Composite Transient Cycle. July 13, 2005. [No change.]

Part IV: 40 CFR PART 1065 – ENGINE-TESTING PROCEDURES

Subpart A – Applicability and General Provisions

§ 1065.1 Applicability. January 24, 2023.

1. Subparagraph (a): Amend as follows:

1.1 Introductory paragraph: [No change.]

1.2 Subparagraphs (1) and (2): [n/a]

1.3 Delete subparagraph (3). Replace with the following: Off-road compression-ignition engines regulated under title 13, CCR, Chapter 9, Article 4, and subject to the emission standards in section 2423.1 of that Article.

1.4 Subparagraph (4): [No change.]

1.5 Subparagraphs (5) through (8): [n/a]

2. Subparagraphs (b) through (i): [No change.]

§ 1065.2 Submitting information to EPA under this part. June 29, 2021. [No change.]

§ 1065.5 Overview of this part 1065 and its relationship to the standard-setting part. January 24, 2023. [No change.]

§ 1065.10 Other procedures.

1. § 1065.10. January 24, 2023. [No change.]

2. **California Provisions**

2.1 The procedures for demonstrating compliance with the Low-Load Cycle Emission standards in title 13, CCR, section 2423.1, subsection (d)(2) are in Part VI, Subpart B.

2.2 The procedures for demonstrating compliance with the Idle NOx Emission standards in title 13, CCR, section 2423.1, subsection (d)(3) are in Part VI, Subpart C.

§ 1065.12 Approval of alternate procedures. April 22, 2024. [No change.]

§ 1065.15 Overview of procedures for laboratory and field testing. October 25, 2016. [No change.]

§ 1065.20 Units of measure and overview of calculations. April 28, 2014. [No change.]

§ 1065.25 Recordkeeping. April 28, 2014. [No change.]

Subpart B – Equipment Specifications

§ 1065.101 Overview. June 30, 2008. [No change.]

§ 1065.110 Work inputs and outputs, accessory work, and operator demand. June 30, 2008. [No change.]

§ 1065.120 Fuel properties and fuel temperature and pressure. June 30, 2008. [No change.]

§ 1065.122 Engine cooling and lubrication. June 30, 2008. [No change.]

§ 1065.125 Engine intake air. September 15, 2011. [No change.]

§ 1065.127 Exhaust gas recirculation. July 13, 2005. [No change.]

§ 1065.130 Engine exhaust. June 29, 2021. [No change.]

§ 1065.140 Dilution for gaseous and PM constituents. January 24, 2023. [No change.]

§ 1065.145 Gaseous and PM probes, transfer lines, and sampling system components. January 24, 2023. [No change.]

§ 1065.150 Continuous sampling. July 13, 2005. [No change.]

§ 1065.170 Batch sampling for gaseous and PM constituents. April 22, 2024. [No change.]

§ 1065.190 PM-stabilization and weighing environments for gravimetric analysis. April 22, 2024. [No change.]

§ 1065.195 PM-stabilization environment for in-situ analyzers. June 30, 2008. [No change.]

Subpart C – Measurement Instruments

§ 1065.201 Overview and general provisions. April 29, 2014. [No change.]

§ 1065.202 Data updating, recording, and control. October 25, 2016. [No change.]

§ 1065.205 Performance specifications for measurement instruments. June 29, 2021. [No change.]

Measurement of Engine Parameters and Ambient Conditions

§ 1065.210 Work input and output sensors. April 22, 2024. [No change.]

§ 1065.215 Pressure transducers, temperature sensors, and dewpoint sensors. June 30, 2008. [No change.]

Flow-Related Measurements

§ 1065.220 Fuel flow meter. June 29, 2021. [No change.]

§ 1065.225 Intake-air flow meter. June 29, 2021. [No change.]

§ 1065.230 Raw exhaust flow meter. April 28, 2014. [No change.]

§ 1065.240 Dilution air and diluted exhaust flow meters. April 28, 2014. [No change.]

§ 1065.245 Sample flow meter for batch sampling. July 13, 2005. [No change.]

§ 1065.247 Diesel exhaust fluid flow rate. June 29, 2021. [No change.]

§ 1065.248 Gas divider. July 13, 2005. [No change.]

CO and CO_2 Measurements

§ 1065.250 Nondispersive infra-red analyzer. April 28, 2014. [No change.]

Hydrocarbon, H_2, and H_2O Measurements

§ 1065.255 H_2 measurement devices. April 22, 2024. [No change]

§ 1065.257 H_2O measurement devices. April 22, 2024. [No change]

§ 1065.260 Flame-ionization detector. January 24, 2023. [No change.]

§ 1065.265 Nonmethane cutter. September 15, 2011. [No change.]

§ 1065.266 Fourier transform infrared analyzer. April 22, 2024. [No change.]

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

§ 1065.267 Gas chromatograph with a flame ionization detector. April 22, 2024. [No change.]

§ 1065.269 Photoacoustic analyzer for ethanol and methanol. April 28, 2014. [No change.]

NO_x, N_2O, and NH_3 Measurements

§ 1065.270 Chemiluminescent NOx analyzer. April 28, 2014. [No change.]

§ 1065.272 Nondispersive ultraviolet NOx analyzer. April 28, 2014. [No change.]

§ 1065.274 Zirconium dioxide (ZrO_2) NOx analyzer. January 24, 2023. [No change.]

§ 1065.275 N_2O measurement devices. April 22, 2024. [No change.]

§ 1065.277 NH_3 measurement devices. April 22, 2024. [No change.]

O_2 and Air-to-Fuel Ratio Measurements

§ 1065.280 Paramagnetic and magnetopneumatic O_2 detection analyzers. April 22, 2024. [No change.]

§ 1065.284 Zirconium dioxide (ZrO_2) air-fuel ratio and O_2 analyzer. April 22, 2024. [No change.]

PM Measurements

§ 1065.290 PM gravimetric balance. November 8, 2010. [No change.]

§ 1065.295 PM inertial balance for field testing analysis. April 28, 2014. [No change.]

§ 1065.298 Correcting real-time PM measurement based on gravimetric PM filter measurement for field-testing analysis. January 24, 2023. [No change.]

Subpart D – Calibrations and Verifications

§ 1065.301 Overview and general provisions. January 24, 2023. [No change.]

§ 1065.303 Summary of required calibration and verifications. June 29, 2021. [No change.]

§ 1065.305 Verifications for accuracy, repeatability, and noise. January 24, 2023. [No change.]

§ 1065.307 Linearity verification. January 24, 2023. [No change.]

§ 1065.308 Continuous gas analyzer system-response and updating-recording verification – for gas analyzers not continuously compensated for other gas species. January 24, 2023. [No change.]

§ 1065.309 Continuous gas analyzer system-response and updating – recording verification – for gas analyzers continuously compensated for other gas species. January 24, 2023. [No change.]

Measurement of Engine Parameters and Ambient Conditions

§ 1065.310 Torque calibration. April 28, 2014. [No change.]

§ 1065.315 Pressure, temperature, and dewpoint calibration. April 22, 2024. [No change.]

Flow-Related Measurements

§ 1065.320 Fuel-flow calibration. January 24, 2023. [No change.]

§ 1065.325 Intake-flow calibration. January 24, 2023. [No change.]

§ 1065.330 Exhaust-flow calibration. January 24, 2023. [No change.]

§ 1065.340 Diluted exhaust flow (CVS) calibration. October 25, 2016. [No change.]

§ 1065.341 CVS and batch sampler verification (propane check). April 22, 2024. [No change.]

§ 1065.342 Sample dryer verification. June 29, 2021. [No change.]

§ 1065.345 Vacuum-side leak verification. January 24, 2023. [No change.]

CO and CO_2 Measurements

§ 1065.350 H_2O interference verification for CO_2 NDIR analyzers. April 22, 2024. [No change.]

§ 1065.355 H_2O and CO_2 interference verification for CO NDIR analyzers. April 22, 2024. [No change.]

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

H_2O Measurements

§ 1065.357 CO_2 interference verification for H_2O FTIR analyzers. April 22, 2024. [No change.]

Hydrocarbon Measurements

§ 1065.360 FID optimization and verification. April 22, 2024. [No change.]

§ 1065.362 Non-stoichiometric raw exhaust FID O_2 interference verification. April 28, 2014. [No change.]

§ 1065.365 Nonmethane cutter penetration fractions and NMC FID response factors. April 22, 2024. [No change.]

§ 1065.366 Interference verification for FTIR analyzers. April 22, 2024. [No change.]

§ 1065.369 H_2O, CO, and CO_2 interference verification for photoacoustic alcohol analyzers. April 22, 2024. [No change.]

NO_x and N_2O Measurements

§ 1065.370 CLD CO_2 and H_2O quench verification. June 29, 2021. [No change.]

§ 1065.372 NDUV analyzer HC and H_2O interference verification. April 22, 2024. [No change.]

§ 1065.375 Interference verification for N_2O analyzers. April 22, 2024. [No change.]

§ 1065.376 Chiller NO_2 penetration. April 28, 2014. [No change.]

§ 1065.377 Interference verification for NH_3 analyzers. April 22, 2024. [No change.]

§ 1065.378 NO_2-to-NO converter conversion verification. April 22, 2024. [No change.]

PM Measurements

§ 1065.390 PM balance verifications and weighing process verification. October 25, 2016. [No change.]

§ 1065.395 Inertial PM balance verifications. July 13, 2005. [No change.]

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

Subpart E – Engine Selection, Preparation, and Maintenance

§ 1065.401 Test engine selection. July 13, 2005. [No change.]

§ 1065.405 Test engine preparation and maintenance. January 24, 2023. [No change.]

§ 1065.410 Maintenance limits for stabilized test engines. January 24, 2023. [No change.]

§ 1065.415 Durability demonstration. June 30, 2008. [No change.]

Subpart F – Performing an Emission Test Over Specified Duty Cycles

§ 1065.501 Overview. January 24, 2023. [No change.]

§ 1065.510 Engine mapping. June 17, 2024. [No change.]

§ 1065.512 Duty cycle generation. April 22, 2024. [No change,]

§ 1065.514 Cycle-validation criteria for operation over specified duty cycles. January 24, 2023. [No change.]

§ 1065.516 Sample system decontamination and preconditioning. April 28, 2014. [No change.]

§ 1065.518 Engine preconditioning. April 28, 2014. [No change.]

§ 1065.520 Pre-test verification procedures and pre-test data collection. April 22, 2024. [No change.]

§ 1065.525 Engine starting, restarting, and shutdown. September 15, 2011. [No change.]

§ 1065.526 Repeating of void modes or test intervals. April 28, 2014. [No change.]

§ 1065.530 Emission test sequence. April 22, 2024. [No change.]

§ 1065.543 Carbon balance error verification. January 24, 2023. [No change.]

§ 1065.545 Validation of proportional flow control for batch sampling. January 24, 2023. [No change.]

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

§ 1065.546 Validation of minimum dilution ratio for PM batch sampling. October 25, 2016. [No change.]

§ 1065.550 Gas analyzer range verification and drift verification. April 22, 2024. [No change.]

§ 1065.590 PM sample media (e.g., filters) preconditioning and tare weighing. October 25, 2016. [No change.]

§ 1065.595 PM sample post-conditioning and total weighing. June 30, 2008. [No change.]

Subpart G – Calculations and Data Requirements

§ 1065.601 Overview. April 22, 2024. [No change.]

§ 1065.602 Statistics. April 22, 2024. [No change.]**§ 1065.610 Duty cycle generation.** April 22, 2024. [No change.]

§ 1065.630 Local acceleration of gravity. January 24, 2023. [No change.]

§ 1065.640 Flow meter calibration calculations. June 29, 2021. [No change.]

§ 1065.642 PDP, SSV, and CFV molar flow rate calculations. June 29, 2021. [No change.]

§ 1065.643 Carbon balance error verification calculations. January 24, 2023. [No change.]

§ 1065.644 Vacuum-decay leak rate. April 22, 2024. [No change.]

§ 1065.645 Amount of water in an ideal gas. October 25, 2016. [No change.]

§ 1065.650 Emission calculations. April 22, 2024. [No change.]

§ 1065.655 Carbon-based chemical balances of fuel, DEF, intake air, and exhaust. April 22, 2024. [No change.]

§ 1065.656 Hydrogen-based chemical balances of fuel, DEF, intake air, and exhaust. June 17, 2024. [No change.]

§ 1065.659 Removed water correction. June 29, 2021. [No change.]

§ 1065.660 THC, NMHC, NMNEHC, CH_4, and C_2H_6 determination. April 22, 2024. [No change.]

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

§ 1065.665 THCE and NMHCE determination. June 29, 2021. [No change.]

§ 1065.667 Dilution air background emission correction. January 24, 2023. [No change.]

§ 1065.670 NO_x intake-air humidity and temperature corrections. April 22, 2024. [No change.]

§ 1065.672 Drift correction. April 22, 2024. [No change.]

§ 1065.675 CLD quench verification calculations. January 24, 2023. [No change.]

§ 1065.680 Adjusting emission levels to account for infrequently regenerating aftertreatment devices. January 24, 2023. [No change.]

§ 1065.690 Buoyancy correction for PM sample media. October 25, 2016. [No change.]

§ 1065.695 Data requirements. April 22, 2024.

[No change, except that "EPA Program Officer" shall mean "CARB Designated Compliance Officer."**]**

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

California Hydrogen Fuel Specifications

1. **Emission Test Fuel**. For all hydrogen-fueled internal combustion engines and equipment that certify either to the Tier 5 standards in title 13, CCR, section 2423.1 or to the Tier 4 standards in title 13, CCR, section 2423, hydrogen test fuel that meets the specifications in SAE J2719 shall be used for all emission measurements.

2. **Service accumulation fuel**. For all hydrogen-fueled internal combustion engines and equipment that certify either to the Tier 5 standards in title 13, CCR, section 2423.1 or to the Tier 4 standards in title 13, CCR, section 2423, hydrogen fuel used for service accumulation shall meet the specifications in SAE J2719.

§ 1065.701 General requirements for test fuels. June 29, 2021. [No change.]

§ 1065.703 Distillate diesel fuel. June 29, 2021. [No change, except as follows.]

Add the following sentence to this section: An engine manufacturer may use a distillate diesel fuel that meets the fuel specifications in Part 1065, Subpart H, section 1065.703, subsection 2 of the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles," incorporated by reference in title 13, CCR, section 1956.8, subsection (b) as an alternative to a distillate diesel fuel that meets the specifications in this section 1065.703.

§ 1065.705 Residual and intermediate residual fuel. April 22, 2024. [No change.]

§ 1065.710 Gasoline.

1. § 1065.710. June 29, 2021. Amend as follows:

1.1 Subparagraphs (a) and (b): [No change.]

1.2 Subparagraph (c): [n/a]

1.3 Subparagraph (d): [No change.]

2. **California Certification Gasoline Specification.**

Add the following subparagraph to section 1065.710, which reads: For all spark-ignition gasoline engines and equipment that certifies to the Tier 5 standards in title 13, CCR, section 2423.1 using the provisions in title 13, CCR, section 2420, subsection (a)(2), gasoline meeting the California Certification Gasoline Specifications in Part II, section A of the "California 2026 and Subsequent Model Year Criteria Pollutant Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," incorporated by reference in title 13, CCR, section 1961.4 may be used in exhaust emission testing, as an option to the specifications set forth in section 1065.710, subparagraph (b). If a manufacturer elects to use gasoline that meets the California Certification Gasoline Specifications, CARB shall conduct exhaust emission testing with gasoline that meets the California Certification Gasoline Specifications. If a manufacturer elects to use gasoline with the specifications set forth in 40 CFR section 1065.710, subparagraph (b), CARB shall conduct exhaust emission testing with gasoline that meets the specifications set forth in 40 CFR section 1065.710, subparagraph (b).

§ 1065.715 Natural gas. April 22, 2024. [No change.]

§ 1065.720 Liquefied petroleum gas. January 24, 2023. [No change.]

§ 1065.725 High-level ethanol-gasoline blends. December 4, 2020. [No change.]

§ 1065.735 Diesel exhaust fluid. October 25, 2016. [No change.]

§ 1065.740 Lubricants. July 13, 2005. [No change.]

§ 1065.745 Coolants. July 13, 2005. [No change.]

§ 1065.750 Analytical gases. June 17, 2024. [No change.]

§ 1065.790 Mass standards. January 24, 2023. [No change.]

Subpart I – Testing with Oxygenated Fuels

§ 1065.801 Applicability. July 13, 2005. [No change.]

§ 1065.805 Sampling system. April 22, 2024. [No change.]

§ 1065.845 Response factor determination. June 30, 2014. [No change.]

§ 1065.850 Calculations. April 28, 2014. [No change.]

Subpart J – Field Testing and Portable Emission Measurement Systems

§ 1065.901 Applicability. January 24, 2023. [No change.]

§ 1065.905 General provisions. June 29, 2021. [No change.]

§ 1065.910 PEMS auxiliary equipment for field testing. January 24, 2023. [No change.]

§ 1065.915 PEMS instruments. January 24, 2023. [No change.]

§ 1065.920 PEMS Calibrations and verifications. January 24, 2023. [No change.]

§ 1065.925 PEMS preparation for field testing. September 15, 2011. [No change.]

§ 1065.930 Engine starting, restarting, and shutdown. July 13, 2005. [No change.]

§ 1065.935 Emission test sequence for field testing. April 22, 2024. [No change.]

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

§ 1065.940 Emission calculations. November 8, 2010. [No change.]

Subpart K – Definitions and Other Reference Information

§ 1065.1001 Definitions. April 22, 2024. [No change.]

§ 1065.1005 Symbols, abbreviations, acronyms, and units of measure. January 24, 2023. [No change.]

§ 1065.1010 Incorporation by reference. April 22, 2024. [No change.]

Subpart L – Methods for Unregulated and Special Pollutants and Additional Procedures

§ 1065.1101 Applicability. April 28, 2014. [No change.]

§ 1065.1103 General provisions for SVOC measurement. April 28, 2014. [No change.]

§ 1065.1105 Sampling system design. October 25, 2016. [No change.]

§ 1065.1107 Sample media and sample system preparation; sample system assembly. October 25, 2016. [No change.]

§ 1065.1109 Post-test sampler disassembly and sample extraction. October 25, 2016. [No change.]

§ 1065.1111 Sample analysis. April 28, 2014. [No change.]

Vanadium Sublimation in SCR Catalysts

§ 1065.1113 General provisions related to vanadium sublimation temperatures in SCR catalysts. January 24, 2023. [No change.]

§ 1065.1115 Reactor design and setup. January 24, 2023. [No change.]

§ 1065.1117 Reactor aging cycle for determination of vanadium sublimation temperature. January 24, 2023. [No change.]

§ 1065.1119 Blank testing. January 24, 2023. [No change.]

§ 1065.1121 Vanadium sample dissolution and analysis in alumina capture beds. January 24, 2023. [No change.]

Smoke Opacity

§ 1065.1123 General provisions for determining exhaust opacity. January 24, 2023. [No change.]

§ 1065.1125 Exhaust opacity measurement system. January 24, 2023. [No change.]

§ 1065.1127 Test procedure for determining percent opacity. January 24, 2023. [No change.]

Accelerated Aftertreatment Aging

§ 1065.1131 General provisions related to accelerated aging of compression-ignition aftertreatment for deterioration factor determination. January 24, 2023. [No change.]

§ 1065.1133 Application selection, data gathering, and analysis. January 24, 2023.

1. Introductory paragraph: [No change.]
2. Subparagraph (a): Amend as follows:

2.1 Introductory paragraph: [No change.]

2.2 Subparagraphs (1) and (2): [No change.]

2.3 Delete subparagraph (3). Replace with the following: ***Sulfur exposure.*** The engine manufacturer shall follow the following procedures to calculate the total sulfur exposure. The total sulfur exposure is the sum of fuel- and oil-related sulfur. Oil-related sulfur will be accounted for in the acceleration of oil exposure directly. We recommend that you determine fuel-related sulfur exposure by selecting an application that represents the 90th percentile of fuel consumption. Use good engineering judgment to determine that average rate of fuel consumption for the target application. You may use a combination of field and laboratory measurements to make this determination. Calculate the average rate of fuel-related sulfur exposure in grams per hour from the average rate of fuel consumption assuming a fuel sulfur level of 10 ppm by weight for diesel. The engine manufacturer shall determine oil-related sulfur exposure for hydrogen-fueled internal combustion engines, but the engine manufacturer shall be exempt from determining fuel-related sulfur exposure for such engines.

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

§ 1065.1135 Determination of key aftertreatment system components. January 24, 2023. [No change.]

§ 1065.1137 Determination of thermal reactivity coefficient. April 22, 2024. [No change.]

§ 1065.1139 Aging cycle generation. April 22, 2024.

1. Introductory paragraph: [No change.]
2. Subparagraphs (a) through (g): [No change.]
3. Subparagraph (h): Amend as follows:

3.1 Introductory paragraph: [No change.]

3.2 Subparagraph (1): [No change.]

3.3 Subparagraph (2): Amend as follows:

3.3.1 Delete introductory paragraph. Replace with the following: ***Fuel sulfur exposure targets.*** The engine manufacturer shall follow the following procedures. The target sulfur exposure rate for fuel-related sulfur is determined by utilizing the field mean fuel rate data for the engine determined in § 1065.1133(a)(3). Calculate the total sulfur exposure mass using this mean fuel rate, the total number of non-accelerated hours to reach full useful life, and a fuel sulfur level of 10 ppmw. Engine manufacturers shall be exempt from determining fuel-related sulfur exposure for hydrogen-fueled internal combustion engines.

3.3.2 Subparagraphs (i) through (iii): [No change.]

§ 1065.1141 Facility requirements for engine-based aging stands. April 22, 2024. [No change.]

§ 1065.1143 Requirements for burner-based aging stands. January 24, 2023. [No change.]

§ 1065.1145 Execution of accelerated aging, cycle tracking, and cycle validation criteria. April 22, 2024.

1. Introductory paragraph: [No change.]
2. Subparagraphs (a) through (d): [No change.]
3. Subparagraph (e): Amend as follows:

3.1 Introductory paragraph: [No change.]

3.2 Subparagraph (1): [No change.]

3.3 Subparagraph (2): Amend as follows:

3.3.1 Introductory paragraph: [No change.]

3.3.2 Subparagraphs (i) and (ii): [No change.]

3.3.3 Delete subparagraph (iii). Replace with the following: ***Sulfur tracking.*** The engine manufacturer shall follow the following procedures. Generate a fuel sulfur exposure line describing the relationship between aging hours and cumulative target sulfur exposure mass. Log actual fuel consumption and the measured fuel sulfur level of the current batch of fuel (if you are doping fuel to accelerate sulfur exposure) for engine stand aging. Use these measurements to ensure that sulfur exposure remains within ±3% of the target sulfur exposure mass. Adjust sulfur doping levels in the fuel from batch to batch as needed to stay within limits. If you use gaseous SO_2 for sulfur acceleration, monitor the mass flow rate of the gaseous sulfur. Use these measurements to calculate total sulfur mass exposure, and correct SO_2 gas flow rates as needed to stay within the control limits. Hydrogen-fueled internal combustion engines are subject to oil-related sulfur exposure but are exempted from meeting fuel-related sulfur exposure.

4. Subparagraph (f): [No change.]

Part V: 40 CFR PART 1068 – GENERAL COMPLIANCE PROVISIONS FOR OFF-ROAD COMPRESSION-IGNITION ENGINE PROGRAMS

Subpart A – Applicability and Miscellaneous Provisions

§ 1068.1 Does this part apply to me? January 24, 2023.

1. Subparagraph (a): Amend as follows:

1.1 Introductory paragraph: [No change.]

1.2 Subparagraphs (1) through (5): [n/a]

1.3 Delete subparagraph (6). Replace with the following: This part 1068 applies for land-based off-road compression-ignition engines that are subject to the provisions of title 13, CCR, section 2423.1.

1.4 Subparagraph (7): [n/a]

1.5 Subparagraph (8): [No change.]

1.6 Subparagraphs (9) through (13): [n/a]

1.7 Subparagraph (14): [No change.]

1.8 Subparagraph (15): [n/a]

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

§ 1068.2 How does this part apply for engines and how does it apply for equipment? October 8, 2008.

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

2. Delete subparagraph (e). Replace with the following: The terminology convention described in this section is not intended to limit CARB's authority or an engine manufacturer's obligations or an equipment manufacturer's obligations under the Clean Air Act or under California Health and Safety Code, Division 26, corresponding regulations, and other applicable California law.

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

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

2. Delete subparagraph (e). Replace with the following: If the engine manufacturer or equipment manufacturer disagrees with CARB's determinations made under paragraph (c) of this section, that manufacturer may request a hearing on those determinations. The request shall be in writing, signed by an authorized

representative of the manufacturer, and shall include a statement specifying the manufacturer's objections to CARB's determinations, and data or other analysis in support of such objections. If, after review of the request and supporting data or analysis, CARB finds that the request raises a substantial factual issue, they shall provide the manufacturer a hearing in accordance with the process for appeals of CARB decisions in title 17, CCR, Article 2, Administrative Hearing Procedures for Petitions for Review of Executive Officer Decisions, section 60055.1, et seq., with respect to such issue.

§ 1068.10 Practices for handling confidential business information. January 24, 2023. [n/a]

Replace with the following: Any engine or equipment manufacturer claiming that some or all of the information submitted pursuant to title 13, CCR, Division 3, Chapter 9, Article 4 (Off-Road Compression-Ignition Engines and Equipment) is confidential should refer to the applicable regulations as provided by title 17, CCR, sections 91000, 91001, 91010, 91011, 91020, 91021, and 91022; and Government Code section 7927.705.

§ 1068.11 Confidentiality determinations and related procedures. January 24, 2023. [n/a]

Replace with the following: Any engine or equipment manufacturer claiming that some or all of the information submitted pursuant to title 13, CCR, Division 3, Chapter 9, Article 4 (Off-Road Compression-Ignition Engines and Equipment) is confidential should refer to the applicable regulations as provided by title 17, CCR, sections 91000, 91001, 91010, 91011, 91020, 91021, and 91022; and Government Code section 7927.705.

§ 1068.15 What general provisions apply for EPA decision-making? October 25, 2016. [No change.]

§ 1068.20 May EPA enter my facilities for inspections? October 25, 2016. [No change.]

§ 1068.25 What information must I give to EPA? April 30, 2010.

1. Introductory paragraph: [No change.]

2. Subparagraph (a): [No change.]

3. Delete subparagraph (b). Replace with the following: An engine manufacturer and an equipment manufacturer shall establish and maintain records, perform tests, make reports, and provide additional information that CARB may require under California Health and Safety Code, Division 26, and corresponding regulations. This also applies to engines and equipment exempted by CARB from emission standards or prohibited acts. Unless specified otherwise by CARB, the

engine manufacturer and the equipment manufacturer shall keep required records for eight calendar years.

4. Delete subparagraph (c). Replace with the following: An engine manufacturer and an equipment manufacturer shall both be responsible for statements and information in its applications for certification or any other requests or reports. If a manufacturer provides statements or information to another party for submission to CARB, the manufacturer shall be responsible for these statements and information as if it had submitted them to CARB directly. For example, knowingly submitting false information to someone else for inclusion in an application for certification would be deemed to be a submission of false information in violation of the California Health and Safety Code, Division 26, and corresponding regulations.

§ 1068.27 May EPA conduct testing with my engines/equipment? October 25, 2016. [No change.]

§ 1068.30 What definitions apply to this part? January 24, 2023. [No change.]

§ 1068.31 Changing the status of nonroad or stationary engines under the definition of "nonroad engine." October 25, 2016. [n/a]

§ 1068.32 Explanatory terms. October 25, 2016. [No change.]

§ 1068.35 What symbols, acronyms, and abbreviations does this part use? October 8, 2008. [No change.]

§ 1068.40 Special provisions for implementing changes in the regulations in this part. October 25, 2016. [n/a]

§ 1068.45 General labeling provisions. October 25, 2016. [n/a]

Replace with the following: The labeling provisions in title 13, CCR, section 2424 shall apply.

§ 1068.50 Adjustable parameters. January 24, 2023. [No change.]

§ 1068.95 Incorporation by reference. October 25, 2016. [No change.]

Subpart B – Prohibited Actions and Related Requirements

§ 1068.101 What general actions does this regulation prohibit?

1. § 1068.101. January 24, 2023. Amend as follows:

1.1 Delete introductory paragraph. Replace with the following: This section specifies actions that are prohibited and the maximum civil penalties that CARB can assess for each violation.

1.2 Subparagraphs (a) through (g): [No change, except that the civil penalties specified in these subparagraphs do not apply for California. Civil penalties for California may be assessed for each engine in violation under the requirements of the California Health and Safety Code, Division 26, and corresponding regulations.]

1.3 Delete subparagraph (h). Replace with the following: A violation of the requirements of this subpart is a violation of the applicable provisions of the California Health and Safety Code, Division 26, and corresponding regulations, and is subject to the penalty provisions thereunder.

2. **California Provision**: Add the following: Under section 43017 of the California Health and Safety Code, the California Air Resources Board may enjoin any violation of any provision of Part V: 40 CFR PART 1068, Subpart B.

§ 1068.103 Provisions related to the duration and applicability of certificates of conformity. October 25, 2016. [No change.]

§ 1068.105 What other provisions apply to me specifically if I manufacture equipment needing certified engines? October 25, 2016. [No change.]

§ 1068.110 Other provisions for engines/equipment in service. October 25, 2016.

1. Delete subparagraph (a). Replace with the following: ***Aftermarket parts and service***. The certifying engine manufacturer shall not require anyone to use its parts or service to maintain or repair an engine or a piece of equipment, unless CARB approves this in the engine manufacturer's application for certification. It is a violation of the applicable provisions of the California Health and Safety Code, Division 26, and corresponding regulations for anyone to manufacture any part that violates the prohibition on defeat devices in Part V: 40 CFR PART 1068, Subpart B, section 1068.101, subsection (b)(2).

2. Delete subparagraph (b). Replace with the following: ***Certifying aftermarket parts***. The manufacturer or rebuilder of an aftermarket engine or equipment part shall be required to certify according to the requirements of title13,

CCR, Chapter 4, Article 2. The aftermarket part rebuilder or manufacturer shall keep all records showing how the part affects emissions and shall provide this information to CARB within 30 calendar days upon request.

3. Subparagraphs (c) and (d): [No change.]

4. Delete subparagraph (e). Replace with the following: ***Warranty and maintenance***. Owners are responsible for properly maintaining their engines and equipment; however, owners may make warranty claims against the engine manufacturer for all expenses related to diagnosing and repairing or replacing emission-related parts, as described in Part V: 40 CFR PART 1068, Subpart B, section 1068.115. Engine manufacturers may ask to limit diagnosis and repair to authorized service facilities, provided this does not limit their ability to meet their warranty obligations under title 13, CCR, section 2425 and Part V: 40 CFR PART 1068, Subpart B, section 1068.115. The warranty period begins when the equipment is first placed into service. See title 13, Division 3, Chapter 9, Article 4, of the California Code of Regulations sections 2423.1 and 2425 for specific requirements. It is a violation of the applicable provisions of the California Health and Safety Code, Division 26, and corresponding regulations for anyone to disable emission controls; see Part V: 40 CFR PART 1068, Subpart B, section 1068.101, subparagraph (b)(1) and title 13, Division 3, Chapter 9, Article 4, of the California Code of Regulations.

§ 1068.115 What are manufacturers' emission-related warranty requirements? October 8, 2008.

1. Delete introductory paragraph. Replace with the following: Title 13, CCR, Chapter 9, Article 4, section 2425, requires certifying manufacturers of compression-ignition engines to warrant to purchasers that their engines are designed, built, and equipped to conform at the time of sale to the applicable regulations for their full useful life, including a warranty that the engines are free from defects in materials and workmanship that would cause an engine to fail to conform to the applicable regulations during the specified warranty period. This section codifies the warranty requirements without intending to limit them.

2. Subparagraphs (a) and (b): [No change.]

§ 1068.120 Requirements for rebuilding engines.

1. § 1068.120. October 25, 2016. [No change.]

2. **California Provisions**

2.1 A company that manufactures or sells off-road engines or equipment and also rebuilds off-road compression-ignition engines, shall provide a report to CARB by September 30 of the calendar year following the end of a

model year that includes:

2.1.1 a numbered list of rebuilt original engines by engine family name, engine model, power category, and tier level, that you worked on for California during the model year,

2.1.2 a numbered list of rebuilt replacement engines by engine family name, engine model, power category, and tier level, that you worked on for California during the model year,

2.1.3 any changes to the emissions configuration of the engine,

2.1.3.1 including the engine family name of the engine being rebuilt,

2.1.3.2 including the reference engine family name corresponding to the emissions configuration of the rebuilt engine,

2.1.4 product number (or other identifier) of the rebuild kit and the replacement components,

2.1.5 serial number of the engine,

2.1.6 hours of operation (or mileage) at the time of rebuild,

2.1.7 work done on the engine or any emission-related control components, including a listing of parts and components that were used,

2.1.8 any engine parameter adjustments,

2.1.9 any emission-related codes or signals that were responded to and reset, and

2.1.10 equipment, including serial number, for which each engine is replaced.

§ 1068.125 What happens if I violate the regulations? October 25, 2016.

Delete. Replace with the following: A violation of the requirements of this subpart is a violation of the applicable provisions of the California Health and Safety Code, Division 26, and corresponding regulations, and is subject to the penalty provisions thereunder.

Subpart C – Exemptions and Exclusions

§ 1068.201 General exemption and exclusion provisions. October 25, 2016. [No change.]

§ 1068.210 Exempting test engines/equipment. January 24, 2023.

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

2. Subparagraph (e): Amend as follows:

2.1 Introductory paragraph: [No change.]

2.2 Subparagraphs (1) and (2): [No change.]

2.3 Subparagraph (3):

2.3.1 Delete introductory paragraph. Replace with the following:

Add a permanent, legible label to all engines and equipment exempted under this section, consistent with title 13, CCR, section 2424, with at least the items in Part V: 40 CFR PART 1068, Subpart C, section 1068.210, subsections 2.3.2 and 2.3.3. The combining of similar federal statements and citations with California statements and citations on these labels is permitted with CARB approval.

2.3.2 Subparagraphs (i) through (iii): [No change.]

2.3.3 Delete subparagraph (vi). Replace with the following: One of these statements (as applicable):

2.3.3.1 “THIS ENGINE IS EXEMPT FROM CALIFORNIA EMISSION STANDARDS AND RELATED REQUIREMENTS.”

2.3.3.2 “THIS EQUIPMENT IS EXEMPT FROM CALIFORNIA EMISSION STANDARDS AND RELATED REQUIREMENTS.”

2.4 Subparagraphs (4) and (5): [No change.]

§ 1068.215 Exempting manufacturer-owned engines/equipment. October 25, 2016.

1. Delete subparagraph (a). Replace with the following: A company is eligible for the exemption for manufacturer-owned engines or equipment only if it is the certifying engine manufacturer of record.

2. Delete subparagraph (b). Replace with the following: By provision of the California Health and Safety Code, Division 26, Part 5, Chapter 1, section 43014, a manufacturer may request for CARB to issue an experimental permit for a nonconforming engine or piece of equipment under the ownership and control of the

manufacturer for the purposes of developing products, assessing production methods, or promoting engines/equipment in the marketplace. The engine/equipment shall not be loaned, leased, or sold to generate revenue, either by itself or for an engine installed in a piece of equipment.

3. Subparagraph (c): Amend as follows:

3.1 Introductory sentence: [No change.]

3.2 Subparagraphs (1) and (2): [No change.]

3.3 Subparagraph (3): Amend as follows:

3.3.1 Delete introductory sentence. Replace with the following: Add a permanent label to all engines/equipment exempted under this section, consistent with title 13, CCR, section 2424, with at least the following items

3.3.2 Subparagraphs (i) through (iii): [No change.]

3.3.3 Delete subparagraph (iv). Replace with the following: One of these statements (as applicable):

3.3.2.1 “THIS ENGINE IS COVERED BY AN EXPERIMENTAL PERMIT AND IS EXEMPT FROM MEETING CALIFORNIA EMISSION STANDARDS AND RELATED REQUIREMENTS.”

3.3.2.2 “THIS EQUIPMENT IS EXEMPT FROM CALIFORNIA EMISSION STANDARDS AND RELATED REQUIREMENTS.”

3.3.4 Add the following statement: The combining of similar federal statements and citations with California statements and citations on these labels is permitted with CARB approval.

§ 1068.220 Exempting display engines/equipment. January 24, 2023.

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

2. Subparagraph (e): Amend as follows:

2.1 Delete introductory paragraph. Replace with the following: To use this exemption, a manufacturer shall add a permanent label to all engines and equipment exempted under this section, consistent with title 13, CCR, section 2424, with at least the following items:

2.2 Subparagraphs (1) through (3): [No change.]

2.3 Delete subparagraph (4). Replace with the following: One of these statements (as applicable).

2.3.1 “THIS ENGINE IS EXEMPT FROM CALIFORNIA EMISSION STANDARDS AND RELATED REQUIREMENTS.”

2.3.2 “THIS EQUIPMENT IS EXEMPT FROM CALIFORNIA EMISSION STANDARDS AND RELATED REQUIREMENTS.”

2.4 Add the following statement: The combining of similar federal statements and citations with California statements and citations on these labels is permitted with CARB approval.

3. Subparagraph (f): [No change.]

§ 1068.225 Exempting engines/equipment for national security. October 25, 2016. [No change.]

§ 1068.230 Exempting engines/equipment for export. October 25, 2016. [No change.]

§ 1068.235 Exempting nonroad engines/equipment used solely for competition. October 25, 2016.

1. Introductory sentence: [No change.]

2. Delete subparagraph (a). Replace with the following: New engines and equipment you produce that are used solely for competition are generally excluded from emission standards. See Title 13, Division 3, Chapter 9, Article 4, of the California Code of Regulations for specific provisions where applicable.

3. Subparagraphs (b) and (c): [No change.]

§ 1068.240 Exempting new replacement engines. January 24, 2023.

1. Introductory paragraph: [No change.]

2. Subparagraph (a): Amend as follows:

2.1 Introductory paragraph: [No change.]

2.2 Subparagraphs (1) and (2): [No change.]

2.3 Subparagraph (3): [n/a]

3. Subparagraph (b): Amend as follows:

3.1 Introductory sentence: [No change.]

3.2 Subparagraph (1): [No change.]

3.3 Subparagraph (2): Amend as follows:

3.3.1 Introductory sentence: [No change.]

3.3.2 Subparagraphs (i) through (iii): [No change.]

3.3.3 Delete subparagraph (iv). Replace with the following: A manufacturer of replacement engines shall keep records to document its basis for making the determinations in paragraphs (b)(2)(i) and (iii) of this section. The manufacturer of replacement engines shall also complete and submit a checklist to CARB as a condition to sell new replacement engines in California, in accordance with title 13, CCR, section 2423.1, subsection (j)(1)(G).

3.4 Subparagraphs (3) and (4): [No change.]

3.5 Delete subparagraph (5). Replace with the following: Except as specified in subparagraph (d) of this section, an engine manufacturer shall add a permanent label, consistent with title 13, CCR, section 2423.1, subsection (j)(1)(E).

3.6 Subparagraph (6): [No change, except that “U.S. commerce” shall mean “California commerce.”]

4. Subparagraph (c): Amend as follows:

4.1 Introductory paragraph: [No change.]

4.2 Delete subparagraph (1). Replace with the following: An engine manufacturer may produce a limited number of replacement engines under this paragraph (c) representing 0.5 percent of your annual production volumes for each power category of engines certified to the exhaust emission standards in title 13, CCR, section 2423. An engine manufacturer shall calculate this number by multiplying its annual California-directed production volume by 0.005 and rounding to the nearest whole number. The engine manufacturer shall determine the appropriate production volume by identifying the highest total annual California-directed production volume of engines from the previous three model years for all of its certified engines from each power category. In unusual circumstances, an engine manufacturer may ask CARB to base its production limits on California-directed production volume for a model year more than three years prior. In the case of unusual circumstances, the engine manufacturer shall provide documentation of the unusual circumstances in its request to CARB. If documentation is unavailable at the time of the request, the engine manufacturer shall provide documentation of the unusual circumstances within 30 calendar days of the request. An engine manufacturer may include stationary engines as part of its California-directed production volume. An engine manufacturer shall

include California-directed engines produced by any affiliated companies and those from any other companies it licenses to produce engines for it.

4.3 Subparagraph (2): [No change, except that “U.S.-directed” shall mean “U.S.-directed and California-directed.”]

4.4 Subparagraph (3): Amend as follows:

4.4.1 Delete the introductory sentence. Replace with the following: An engine manufacturer shall electronically send CARB a report by September 30 of the calendar year following any calendar year in which it produced exempted replacement engines under this paragraph (c). The report shall include the following information:

4.4.2 Subparagraphs (i) through (iii): [No change.]

4.5 Subparagraphs (4) and (5): [No change.]

5. Subparagraph (d): Amend as follows:

5.1 Introductory sentence: [No change.]

5.2 Subparagraph (1): [No change.]

5.3 Subparagraph (2): Amend as follows:

5.3.1 Introductory sentence: [No change.]

5.3.2 Delete subparagraph (i). Replace with the following: If an engine manufacturer has a reasonable basis to believe that the fully assembled engine will include the original emission control information label, the engine manufacturer may add a removable label to the engine with its corporate name and trademark and the statement: “This replacement engine is exempt under title 13, CCR, section 2423.1(j).” This would generally apply if all the engine models that are compatible with the replacement engine were covered by an Executive Order, and they were labeled in a position on the engine or equipment that is not included as part of the partially complete engine being shipped for replacement purposes. Removable labels shall meet the requirements specified in Part V: 40 CFR PART 1068, Subpart A, section 1068.45.

5.3.3 Delete subparagraph (ii). Replace with the following: If an engine manufacturer does not qualify for using a removable label in subparagraph (d)(2)(i) of this section, the engine manufacturer shall add a permanent label in a readily visible location, though it may be obscured after installation in a piece of equipment. The engine manufacturer shall include on the permanent label its corporate name and trademark, the engine's part

number (or other identifying information), and the statement: “THIS REPLACEMENT ENGINE IS EXEMPT UNDER TITLE 13, CCR, SECTION 2423.1(j).” If there is not enough space for this statement, the engine manufacturer shall alternatively add: “REPLACEMENT” or “SERVICE ENGINE.” For purposes of this subparagraph (d)(2), engine part numbers permanently stamped or engraved on the engine are considered to be included on the label.

6. Subparagraph (e): [No change, except that “U.S. commerce” shall mean “California commerce.”]

7. Delete subparagraph (f). Replace with the following: ***Emission credits.*** Replacement engines exempted under this section shall not generate or use emission credits under title 13, CCR, section 2423.1 nor be part of any associated CA-ABT credit calculations under Part III: 40 CFR PART 1039, Subpart H.

8. **California Provisions**

Add the following: A manufacturer of replacement engines shall electronically send CARB a report by September 30 of the calendar year following any calendar year in which it produced exempted replacement engines. This report shall include the following:

8.1 All information required under § 1068.240, subparagraph (c),

8.2 The number of California-directed replacement engines produced under § 1068.240, subparagraph (b), and

8.3 All information required under title 13, CCR, section 2423.1, subsection (j)(3).

§ 1068.245 Temporary provisions address hardship due to unusual circumstances. October 25, 2016.

1. Subparagraph (a): [No change, except that “U.S. commerce” shall mean “California commerce.”]

2. Subparagraphs (b) through (f): [No change.]

3. Subparagraph (g): Amend as follows:

3.1 Delete introductory sentence. Replace with the following: Add a permanent label to all engines and equipment exempted under this section consistent with the labeling provisions in title 13, CCR, section 2424, with at least the following items:

3.2 Subparagraphs (1) through (3): [No change.]

3.3 Subparagraph (4): Amend as follows:

3.3.1 Introductory sentence: [No change.]

3.3.2 Delete subparagraph (i). Replace with the following: If the engine or equipment does not meet any emission standards, the engine manufacturer shall add one of the following statements. The combining of similar federal statements and citations with California statements and citations on these labels is permitted with CARB approval.

3.3.2.1 "THIS ENGINE IS EXEMPT UNDER 13 CCR 2423.1(i)(7) FROM EMISSION STANDARDS AND RELATED REQUIREMENTS."

3.3.2.2 "THIS EQUIPMENT IS EXEMPT UNDER 13 CCR 2423.1(i)(7) FROM EMISSION STANDARDS AND RELATED REQUIREMENTS."

3.3.3 Subparagraph (ii): [No change.]

§ 1068.250 Extending compliance deadlines for small businesses under hardship. October 25, 2016.

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

2. Delete subparagraph (b). Replace with the following: To be eligible for this exemption, an engine manufacturer shall qualify under title 13, CCR, section 2423.1 for special provisions for small businesses or small-volume engine manufacturers.

3. Subparagraphs (c) through (j): [No change.]

4. Subparagraph (k): Amend as follows:

4.1 Delete introductory paragraph. Replace with the following: Add a permanent label to all engines/equipment exempted under this section, consistent with the labeling provisions in title 13, CCR, section 2424, with at least the following items:

4.2 Subparagraphs (1) through (3): [No change.]

4.3 Subparagraph (4): Amend as follows:

4.3.1 Introductory sentence: [No change.]

4.3.2 Delete subparagraph (i). Replace with the following: If the engine or equipment does not meet any emission standards, add one of the following statements, as applicable. The combining of similar federal

statements or citations with California statements or citations on these labels is permitted with CARB approval.

4.3.2.1 “THIS ENGINE IS EXEMPT UNDER 13 CCR 2423.1(i)(7) FROM EMISSION STANDARDS AND RELATED REQUIREMENTS.”

4.3.2.2 “THIS EQUIPMENT IS EXEMPT UNDER 13 CCR 2423.1(i)(7) FROM EMISSION STANDARDS AND RELATED REQUIREMENTS.”

4.3.3 Subparagraph (ii): [No change.]

§ 1068.255 Exempting engines and fuel-system components for hardship for equipment manufacturers and secondary engine manufacturers. October 25, 2016.

1. Introductory paragraph: [No change.]

2. Subparagraph (a): [No change.]

3. Subparagraph (b): Amend as follows:

3.1 Delete introductory paragraph. Replace with the following: ***Engine and fuel-system component exemption***. An engine manufacturer or fuel-system component manufacturer may produce nonconforming products for the equipment that is exempted by CARB in paragraph (a) of this section. The manufacturer does not have to request this exemption, but shall have written assurance from equipment manufacturers that they need a certain number of exempted products under this section. Label engines or fuel-system components as follows, consistent with the labeling provisions in title 13, CCR, section 2424:

3.2 Subparagraph (1): Amend as follows:

3.2.1 Introductory sentence: [No change.]

3.2.2 Subparagraphs (i) through (iii): [No change.]

3.2.3 Delete subparagraph (iv). Replace with the following: If the engine does not meet any emission standards: “THIS ENGINE IS EXEMPT UNDER 13 CCR 2423.1(i)(7) FROM EMISSION STANDARDS AND RELATED REQUIREMENTS.” If the engine meets alternate emission standards as a condition of an exemption under this section, CARB may specify a different statement to identify the alternate emission standards.

3.2.4 Add the following: The combining of similar federal statements and citations with California statements and citations on these labels is permitted with CARB approval.

3.3 Subparagraph (2): Amend as follows:

3.3.1 Introductory sentence: [No change.]

3.3.2 Subparagraph (i): [No change.]

3.3.3 Delete subparagraph (ii). Replace with the following: The statement “EXEMPT UNDER 13 CCR 2423.1(i)(7).”

4. Subparagraph (c): [No change.]

§ 1068.260 General provisions for selling or shipping engines that are not yet in their certified configuration. October 25, 2016.

[No change, except that references to “United States” shall mean “California.”]

§ 1068.261 Delegated assembly and other provisions related to engines not yet in the certified configuration. January 24, 2023. [No change.]

§ 1068.262 Shipment of engines to secondary engine manufacturers. October 25, 2016. [No change, except that “U.S. commerce” shall mean “California commerce.”.]

§ 1068.265 Provisions for engines/equipment conditionally exempted from certification. October 8, 2008.

[No change, except that the reference to “averaging, banking, or trading” shall mean “CA-ABT.”]

Subpart D – Imports

§ 1068.301 General provisions for importing engines/equipment. January 24, 2023. [No change, except as follows.]

Add the following: CARB may seek independent enforcement action against manufacturers for violations of this subpart D per the provisions of California Health and Safety Code, Division 26, and corresponding regulations, which may include civil penalties, injunctive relief, and revocation of Executive Orders.

§ 1068.305 How do I get an exemption or exclusion for imported engines/equipment? October 25, 2016. [No change, except as follows.]

Add the following: For any engine whose destination is California, a manufacturer must submit the information required by this section to CARB.

§ 1068.310 Exclusions for imported engines/equipment. January 24, 2023. [No change.]

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

§ 1068.315 Permanent exemptions for imported engines/equipment. January 24, 2023. [No change.]

§ 1068.325 Temporary exemptions for imported engines/equipment. January 24, 2023. [No change.]

§ 1068.335 Penalties for violations. October 8, 2008. [No change.]

§ 1068.360 Restrictions for assigning a model year to imported engines and equipment. October 25, 2016. [No change.]

Subpart E – Selective Enforcement Auditing

§ 1068.401 What is a selective enforcement audit? October 25, 2016. [No change.]

§ 1068.405 What is in a test order? October 25, 2016. [No change.]

§ 1068.410 How must I select and prepare my engines/equipment? April 30, 2010. [No change.]

§ 1068.415 How do I test my engines/equipment? October 25, 2016. [No change.]

§ 1068.420 How do I know when my engine family fails an SEA? October 25, 2016. [No change.]

§ 1068.425 What happens if one of my production-line engines/equipment exceeds the emission standards? October 25, 2016.

1. Subparagraph (a): Amend as follows:

   1.1 Delete introductory paragraph. Replace with the following: If one of an engine manufacturer's production-line engines fails to meet one or more emission standards (see Part V: 40 CFR PART 1068, Subpart E, section 1068.420), civil penalties for California may be assessed for each engine in violation under the requirements of the California Health and Safety Code, Division 26, and corresponding regulations. The engine manufacturer shall also take the following actions:

   1.2 Subparagraphs (1) and (2): [No change.]

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

§ 1068.430 What happens if an engine family fails an SEA? October 25, 2016.

1. Subparagraphs (a) and (b): [No change.]

2. Delete subparagraph (c). Replace with the following: An engine manufacturer may ask for a hearing as described in title 17, CCR, sections 6055.1 et seq. to determine whether the tests and sampling methods were proper up to 15 business days after CARB suspends the Executive Order for a family. If CARB agrees that we used erroneous information in deciding to suspend the Executive Order before a hearing is held, CARB shall reinstate the Executive Order.

§ 1068.435 May I sell engines/equipment from a family with a suspended certificate of conformity? October 8, 2008. [No change.]

§ 1068.440 How do I ask EPA to reinstate my suspended certificate? April 30, 2010. [No change.]

§ 1068.445 When may EPA revoke my certificate under this subpart and how may I sell these engines again? October 8, 2008.

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

2. Subparagraph (b): Amend as follows:

2.1 Introductory sentence: [No change.]

2.2 Delete subparagraph (1). Replace with the following: If CARB determines that the engine manufacturer's proposed design change may not control emissions for the engine or equipment's full useful life, CARB shall tell the engine manufacturer 30 calendar days after receiving the engine manufacturer's report. In this case CARB shall decide whether production-line testing will be enough for CARB to evaluate the change or whether the engine manufacturer needs to do more testing.

2.3 Subparagraphs (2) and (3): [No change.]

§ 1068.450 What records must I send to EPA? January 24, 2023.

[No change, except that "U.S.-directed" shall mean "U.S.-directed and California-directed."]

§ 1068.455 What records must I keep? October 8, 2008. [No change.]

Appendix A to Subpart E of Part 1068 – Plans for Selective Enforcement Auditing October 8, 2008. [n/a]

Replace with the following California Provisions:

The following tables describe sampling plans for selective enforcement audits, as described in Part V: 40 CFR PART 1068, Subpart E, section 1068.420:

Table A-1 – Sampling Plan Code Letter

Projected California Engine Family Sales	*Code letter*[1]	*Minimum Number of Tests*		*Maximum Number of Tests*
		To Pass	*To Fail*	
12-20	AAA	3	4	12
20 - 50	AA	3	5	20
20 – 99	A	4	6	30
100 - 299	B	5	6	40
300 - 499	C	5	6	50
500 +	D	5	6	60

[1] A manufacturer may optionally use either the sampling plan for code letter "AA" or sampling plan for code letter "A" for Selective Enforcement Audits of engine families with annual sales between 20 and 50 engines. Additionally, the manufacturer may switch between these plans during the audit.

Table A-2 – Sampling Plans for Different Engine Family Sales Volumes

Stage[a]	*AAA*		*AA*		*A*		*B*		*C*		*D*	
	Pass #	*Fail #*	*Pass #*	*Fail #*	*Pass #*	*Fail #*	*Pass #*	*Fail #*	*Pass #*	*Fail #*	*Pass #*	*Fail #*
1												
2												
3	0		0									
4	1	4	0		0							
5	1	5	1	5	0		0		0		0	
6	2	5	1	6	1	6	1	6	0	6	0	6
7	2	6	2	6	1	7	1	7	1	7	1	7
8	3	6	2	7	2	7	2	7	2	7	2	8

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

Stage[a]	AAA		AA		A		B		C		D	
	Pass #	Fail #	Pass #	Fail #	Pass #	Fail #	Pass #	Fail #	Pass #	Fail #	Pass #	Fail #
9	3	6	3	7	2	8	2	8	2	8	2	8
10	4	6	3	8	3	8	3	8	3	9	3	9
11	4	6	4	8	3	8	3	9	3	9	3	9
12	5	6	4	9	4	9	4	9	4	10	4	10
13			5	9	5	10	4	10	4	10	4	10
14			5	10	5	10	5	10	5	11	5	11
15			6	10	6	11	5	11	5	11	5	11
16			6	10	6	11	6	12	6	12	6	12
17			7	10	7	12	6	12	6	12	6	12
18			8	10	7	12	7	13	7	13	7	13
19			8	10	8	13	8	13	7	13	7	13
20			9	10	8	13	8	14	8	14	8	14
21					9	14	9	14	8	14	8	14
22					10	14	9	15	9	15	9	15
23					10	15	10	15	10	15	9	15
24					11	15	10	16	10	16	10	16
25					11	16	11	16	11	16	11	16
26					12	16	11	17	11	17	11	17
27					12	17	12	17	12	17	12	17
28					13	17	12	18	12	18	12	18
29					14	17	13	18	13	18	13	19
30					16	17	13	19	13	19	13	19
31							14	19	14	19	14	20
32							14	20	14	20	14	20
33							15	20	15	20	15	21
34							16	21	15	21	15	21
35							16	21	16	21	16	22

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

Stage[a]	AAA		AA		A		B		C		D	
	Pass #	Fail #	Pass #	Fail #	Pass #	Fail #	Pass #	Fail #	Pass #	Fail #	Pass #	Fail #
36							17	22	16	22	16	22
37							17	22	17	22	17	23
38							18	22	18	23	17	23
39							18	22	18	23	18	24
40							21	22	19	24	18	24
41									19	24	19	25
42									20	25	19	26
43									20	25	20	26
44									21	26	21	27
45									21	27	21	27
46									22	27	22	28
47									22	27	22	28
48									23	27	23	29
49									23	27	23	29
50									26	27	24	30
51											24	30
52											25	31
53											25	31
54											26	32
55											26	32
56											27	33
57											27	33
58											28	33
59											28	33
60											32	33

[a] Stage refers to the cumulative number of engines/equipment tested.

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

Subpart F – Reporting Defects and Recalling Engines/Equipment

§ 1068.501 How do I report emission-related defects? October 25, 2016.

1. Introductory paragraph: [No change.]

2. Subparagraphs (a): Amend as follows:

2.1 Introductory paragraph: [No change.]

2.2 Subparagraphs (1) through (7): [No change.]

2.3 Delete subparagraph (8). Replace with the following: Send all reports required by this section to CARB through Fowswarranty@arb.ca.gov.

2.4 Subparagraph (9): [No change.]

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

4. Delete subparagraph (e). Replace with the following: ***Thresholds for conducting a defect investigation***. For all engine power categories, an engine manufacturer shall begin a defect investigation if 12 or more California-certified engines or pieces of equipment may have the defect or if 10.0 percent of the total number of California-certified engines or pieces of equipment in the family may have the defect (whichever is greater).

5. Delete subparagraph (f). Replace with the following: ***Thresholds for filing a defect report***. For all engine power categories, an engine manufacturer shall send a defect report if 12 or more California-certified engines or pieces of equipment have the defect or if 4.0 percent of the total number of California -certified engines or pieces of equipment in the family have the defect (whichever is greater).

6. Subparagraphs (g) through (i): [No change.]

§ 1068.505 How does the recall program work? October 25, 2016. [n/a]

Replace with the following: Off-road engines subject to provisions of subpart B of this part shall be subject to recall regulations specified in title 13, CCR, Chapter 2, Article 2.1, sections 2111, 2112.1, 2113.1, 2114.1, 2115, 2116.1, 2118.1, 2119, 2120, and 2121.1, Article 2.2, sections 2122.1, 2123, 2124.1, 2125, 2125.1, 2126.1, 2127, 2127.1, 2128.1, 2130.1, 2131, 2132, 2133, 2134, and 2135, Article 2.3, sections 2136.1, 2137.1, 2138.1, 2139, 2139.1, and 2140.1, Article 2.4, sections 2141.1, 2142, 2143.1, 2147, 2148, and 2149, and title 13, CCR, Chapter 9, Article 4, section 2425.2.

§ 1068.510 How do I prepare and apply my remedial plan? October 25, 2016. [n/a]

Replace with the following: Off-road engines subject to provisions of subpart B of this part shall be subject to recall regulations specified in title 13, CCR, Chapter 2, Article 2.1, sections 2113.1 and 2114.1 and Article 2.2, sections 2125, 2125.1 and 2126.1.

§ 1068.515 How do I mark or label repaired engines/equipment? October 25, 2016. [n/a]

Replace with the following: Off-road engines subject to provisions of subpart B of this part shall be subject to recall regulations specified in title 13, CCR, Chapter 2, Article 2.1, section 2116.1 and Article 2.2, section 2128.1.

§ 1068.520 How do I notify affected owners? October 25, 2016. [n/a]

Replace with the following: Off-road engines subject to provisions of subpart B of this part shall be subject to recall regulations pertaining to notification of affected owners that are specified in title 13, CCR, Chapter 2, Article 2.1, section 2118.1 and Article 2.2, section 2127 and 2127.1.

§ 1068.525 What records must I send to EPA? October 8, 2008. [n/a]

Replace with the following: Off-road engines subject to provisions of subpart B of this part shall be subject to reporting requirements for recall regulations that are specified in title 13, CCR, Chapter 2, Article 2.1, section 2119 and Article 2.2, section 2133.

§ 1068.530 What records must I keep? October 25, 2016. [n/a]

Replace with the following: Off-road engines subject to provisions of subpart B of this part shall be subject to recordkeeping requirements for recall regulations that are specified in title 13, CCR, Chapter 2, Article 2.1, section 2119 and Article 2.2, section 2133.

§ 1068.535 How can I do a voluntary recall for emission-related problems? October 8, 2008. [n/a]

Replace with the following: Off-road engines subject to provisions of subpart B of this part shall be subject to voluntary recall regulations that are specified in title 13, CCR, Chapter 2, Article 2.1, sections 2111, 2112.1, 2113.1, 2114.1, 2115, 2116.1, 2118.1, 2119, 2120, and 2121.1.

Subpart G – Hearings

§ 1068.601 Overview. January 24, 2023. [n/a]

Replace with the following: An engine or equipment manufacturer may request a hearing on a CARB decision regarding certification, as specified in title 17, CCR, Division 3, Chapter 1, Subchapter 1.25, Articles 1 and 2.

§ 1068.610 Request for hearing – suspending, revoking, or voiding a certificate of conformity. October 25, 2016. [n/a]

Replace with the following: An engine or equipment manufacturer may request a hearing on a CARB decision regarding certification, as specified in title 17, CCR, Division 3, Chapter 1, Subchapter 1.25, Articles 1 and 2.

§ 1068.615 Request for hearing – denied application for certification, automatically suspended certificate, and determinations related to certification. October 25, 2016. [n/a]

Replace with the following: An engine or equipment manufacturer may request a hearing on a CARB decision regarding certification, as specified in title 17, CCR, Division 3, Chapter 1, Subchapter 1.25, Articles 1 and 2.

§ 1068.620 Request for hearing – recall. October 25, 2016. [n/a]

Replace with the following: An engine or equipment manufacturer may request a hearing on a CARB decision regarding certification, as specified in title 17, CCR, Division 3, Chapter 1, Subchapter 1.25, Articles 1 and 2.

§ 1068.625 Request for hearing – nonconformance penalties. October 25, 2016. [n/a]

Replace with the following: An engine or equipment manufacturer may request a hearing on a CARB decision regarding certification, as specified in title 17, CCR, Division 3, Chapter 1, Subchapter 1.25, Articles 1 and 2.

§ 1068.630 Request for hearing – allowable maintenance. January 24, 2023. [n/a]

Replace with the following: An engine or equipment manufacturer may request a hearing on a CARB decision regarding certification, as specified in title 17, CCR, Division 3, Chapter 1, Subchapter 1.25, Articles 1 and 2.

§ 1068.650 Procedures for informal hearings. October 25, 2016. [n/a]

Replace with the following: An engine or equipment manufacturer may request a hearing on a CARB decision regarding certification, as specified in title 17, CCR, Division 3, Chapter 1, Subchapter 1.25, Articles 1 and 2.

Appendix A to Part 1068 – Emission-Related Components. January 24, 2023. [No change.]

Appendix B to Part 1068 – Emission-Related Parameters and Specifications. January 24, 2023. [No change.]

Appendix C to Part 1068 – High-Altitude Counties. January 24, 2023. [n/a]

Part VI: ADDITIONAL CALIFORNIA TIER 5 REQUIREMENTS

This Part describes additional certification and in-use compliance requirements that must be met for compression-ignition engines and equipment sold in California.

Subpart A – Inducements Related to Selective Catalytic Reduction (SCR).

[**TO BE DETERMINED**]

Subpart B – Off-Road Low-Load Cycle Test.

1. **General Provisions.**

1.1 An engine manufacturer shall measure emissions using the transient Off-Road Low-Load Cycle (OR-LLC) as described in Part VI, Subpart B to determine whether engines meet the OR-LLC emission standards in title 13, CCR, section 2423.1, subsection (d)(2).

1.2 The Off-Road Low-Load Duty Cycle is described in Part VI, Subpart B, section 7.

2. **Off-Road Low-Load Cycle Test Procedure.**

An engine manufacturer shall use the following procedures for testing engines using the Off-Road Low-Load Duty Cycle. The duty cycle is based on normalized speed and torque values.

2.1 Denormalize speed and torque values as described in Part IV: 40 CFR PART 1065, Subpart F, section 1065.512 and Part IV: 40 CFR PART 1065, Subpart G, section 1065.610, subparagraph (d), respectively.

2.2 For all operations at both zero percent normalized speed and zero percent normalized torque, the engine manufacturer shall set the dynamometer torque demand such that engine power represents an accessory load that is equal to 3.5 percent of emission-data engine's declared maximum power for the engine family.

2.3 If the engine does not operate below a certain minimum torque (as specified in Part IV: 40 CFR PART 1065, Subpart G, section 1065.610, subsection (d)(4)) under normal in-use conditions, the engine manufacturer shall use a declared minimum torque as the reference value instead of any value denormalized to be less than the declared value, as described in Part IV: 40 CFR PART 1065, Subpart G, section 1065.610, subsection (d)(4).

3. **Special Procedures.**

An engine manufacturer may request to use special procedures if the engine cannot be tested using the specified procedures, as described in Part IV: 40 CFR PART 1065, Subpart A, section 1065.10, subsection (c)(2).

4. **Requirements for Engines with Automatic Engine Shutdown (AES) or Stop-Start Technology.**

4.1 For engines with AES or stop-start technology, an engine manufacturer shall disable AES or stop-start technology during off-road low-load cycle certification

testing to simulate equipment applications and tasks that would result in continuous engine operation at off-road low-load conditions.

4.2 An engine manufacturer shall submit an attestation with the Application for Certification that use of AES or stop-start technology will not cause emissions from the engine to exceed the SOS Emissions In-Use Thresholds in Part II, Subpart A, section 3.5.1.2 in-use.

4.3 CARB may conduct in-use compliance emission testing on any engine either with the AES or stop-start technology enabled or with the AES or stop-start technology disabled. Compliance with the in-use compliance requirements in Part II, Subpart B requires that NOx emissions from an engine are at or below the SOS Emissions In-Use Thresholds in Part II, Subpart A, section 3.5.1.2 while the engine operates with the AES or stop-start technology enabled and also with the AES or stop-start technology disabled.

5. **Test Sequence.**

5.1 **Preconditioning**

5.1.1 The engine manufacturer shall precondition the engine by running one or two NRTCs with each NRTC followed by (20 ±1) minutes with no engine operation. CARB shall precondition the engine by running two NRTCs with each NRTC followed by (20 ±1) minutes with no engine operation. Any preconditioning NRTC may be started with a hot engine.

5.1.2 Following the 20 ± 1 minute engine off soak, the engine manufacturer shall run the Off-Road Low-Load Test Cycle.

5.2 **Emission Testing**

5.2.1 The engine manufacturer shall perform testing as described in Part IV: 40 CFR PART 1065, Subpart F, section 1065.530 for a test interval that includes engine starting.

5.2.2 The engine manufacturer shall calculate the total emission mass of each constituent, m, and the total work, W, as described in Part IV: 40 CFR PART 1065, Subpart G, section 1065.650.

5.2.3 For batch sampling, the engine manufacturer shall sample background continuously into a bag over the course of the test interval.

6. **Calculation and Evaluation of Cycle Statistics**

The engine manufacturer shall calculate and evaluate cycle statistics as specified in Part IV: 40 CFR PART 1065, Subpart F, section 1065.514.

7. **Off-Road Low-Load Duty Cycle Schedule: Speed and Torque vs. Time.**

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1	0	0	31	6	7
2	0	0	32	7	7
3	0	0	33	7	7
4	0	0	34	8	7
5	0	0	35	8	7
6	0	0	36	9	7
7	0	0	37	9	7
8	0	0	38	10	8
9	0	0	39	10	8
10	0	0	40	10	7
11	0	0	41	9	6
12	0	0	42	8	6
13	0	0	43	8	6
14	0	0	44	7	6
15	0	0	45	7	6
16	0	0	46	7	6
17	0	0	47	6	6
18	0	0	48	6	6
19	0	0	49	6	7
20	2	11	50	7	7
21	5	11	51	7	7
22	8	10	52	8	7
23	10	8	53	8	7
24	11	7	54	8	7
25	11	7	55	8	7
26	9	7	56	9	6
27	7	7	57	9	6
28	5	7	58	9	6
29	4	7	59	9	7
30	5	7	60	9	7

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
61	9	7	91	5	12
62	9	7	92	9	13
63	9	7	93	16	12
64	9	7	94	23	11
65	9	7	95	25	9
66	9	6	96	23	9
67	9	6	97	19	10
68	9	7	98	16	10
69	8	8	99	13	10
70	8	8	100	11	10
71	8	8	101	11	10
72	6	7	102	13	10
73	4	8	103	17	10
74	2	8	104	21	10
75	2	8	105	25	11
76	2	8	106	27	11
77	2	9	107	28	10
78	6	10	108	24	8
79	12	11	109	18	8
80	20	11	110	10	8
81	27	10	111	4	9
82	31	8	112	0	11
83	31	7	113	0	12
84	28	7	114	0	12
85	22	8	115	0	12
86	17	8	116	0	13
87	12	9	117	0	14
88	8	9	118	0	15
89	6	10	119	0	15
90	5	11	120	0	13

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
121	0	14	151	18	33
122	0	26	152	22	26
123	0	42	153	24	20
124	0	49	154	25	17
125	0	45	155	25	17
126	0	40	156	25	17
127	0	35	157	25	17
128	0	28	158	25	16
129	0	22	159	25	16
130	0	21	160	24	15
131	0	23	161	23	16
132	0	25	162	21	18
133	0	26	163	20	20
134	0	27	164	19	21
135	0	30	165	17	22
136	4	31	166	17	23
137	7	28	167	16	25
138	9	23	168	16	27
139	10	19	169	15	30
140	10	19	170	15	31
141	9	19	171	15	31
142	9	20	172	14	28
143	9	21	173	12	24
144	10	21	174	8	20
145	10	23	175	4	19
146	10	23	176	0	20
147	11	23	177	0	17
148	12	24	178	0	11
149	13	29	179	0	0
150	14	35	180	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
181	0	0	211	49	36
182	3	3	212	60	36
183	7	4	213	71	26
184	12	5	214	77	20
185	15	6	215	76	20
186	16	8	216	70	22
187	15	9	217	64	26
188	15	9	218	62	26
189	16	9	219	63	21
190	18	10	220	63	18
191	19	10	221	63	19
192	20	9	222	63	19
193	20	9	223	63	18
194	20	13	224	62	17
195	20	18	225	62	18
196	19	26	226	61	20
197	18	37	227	62	22
198	16	47	228	64	27
199	15	49	229	68	30
200	16	43	230	73	28
201	20	31	231	76	22
202	32	19	232	78	20
203	50	10	233	80	20
204	56	7	234	81	20
205	46	11	235	82	19
206	35	24	236	82	16
207	40	32	237	81	14
208	53	26	238	79	14
209	55	19	239	79	16
210	48	25	240	78	17

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
241	78	17	271	22	19
242	78	18	272	23	18
243	78	17	273	23	17
244	79	17	274	23	18
245	79	17	275	23	19
246	79	16	276	23	19
247	79	16	277	22	16
248	79	19	278	20	9
249	81	29	279	15	1
250	86	35	280	9	2
251	90	30	281	3	2
252	91	20	282	0	11
253	89	12	283	0	19
254	83	4	284	0	19
255	74	4	285	0	13
256	60	3	286	0	0
257	45	3	287	0	0
258	29	2	288	0	30
259	16	2	289	0	54
260	9	17	290	0	61
261	8	27	291	0	44
262	10	31	292	0	21
263	14	30	293	0	0
264	19	25	294	0	0
265	22	17	295	0	0
266	22	11	296	0	0
267	20	12	297	0	0
268	18	16	298	0	0
269	18	18	299	0	0
270	19	19	300	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
301	0	0	331	0	0
302	0	0	332	0	0
303	0	0	333	0	0
304	0	0	334	0	0
305	0	0	335	0	0
306	0	0	336	0	0
307	0	0	337	0	0
308	0	0	338	0	0
309	0	0	339	0	0
310	0	0	340	0	0
311	0	0	341	0	0
312	0	0	342	0	0
313	0	0	343	0	0
314	0	0	344	0	0
315	0	0	345	0	0
316	0	0	346	0	0
317	0	0	347	0	0
318	0	0	348	0	0
319	0	0	349	0	0
320	0	0	350	0	0
321	0	0	351	0	0
322	0	0	352	0	0
323	0	0	353	0	0
324	0	0	354	0	0
325	0	0	355	0	0
326	0	0	356	0	0
327	0	0	357	0	0
328	0	0	358	0	0
329	0	0	359	0	0
330	0	0	360	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
361	0	0	391	0	0
362	0	0	392	0	0
363	0	0	393	0	0
364	0	0	394	0	0
365	0	0	395	0	0
366	0	0	396	0	0
367	0	0	397	0	0
368	0	0	398	0	0
369	0	0	399	0	0
370	0	0	400	0	0
371	0	0	401	0	0
372	0	0	402	0	0
373	0	0	403	0	0
374	0	0	404	0	0
375	0	0	405	0	0
376	0	0	406	0	0
377	0	0	407	0	0
378	0	0	408	0	0
379	0	0	409	0	0
380	0	0	410	0	0
381	0	0	411	0	0
382	0	0	412	0	0
383	0	0	413	0	0
384	0	0	414	0	0
385	0	0	415	0	0
386	0	0	416	0	0
387	0	0	417	0	0
388	0	0	418	0	0
389	0	0	419	0	0
390	0	0	420	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
421	0	0	451	0	0
422	0	0	452	0	0
423	0	0	453	0	0
424	0	0	454	0	0
425	0	0	455	0	0
426	0	0	456	0	0
427	0	0	457	0	0
428	0	0	458	0	0
429	0	0	459	0	0
430	0	0	460	0	0
431	0	0	461	0	0
432	0	0	462	0	0
433	0	0	463	0	0
434	0	0	464	0	0
435	0	0	465	0	0
436	0	0	466	0	0
437	0	0	467	0	0
438	0	0	468	0	0
439	0	0	469	0	0
440	0	0	470	0	0
441	0	0	471	0	0
442	0	0	472	0	0
443	0	0	473	0	0
444	0	0	474	0	0
445	0	0	475	0	0
446	0	0	476	0	0
447	0	0	477	0	0
448	0	0	478	0	0
449	0	0	479	0	0
450	0	0	480	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
481	0	0	511	0	0
482	0	0	512	0	0
483	0	0	513	0	0
484	0	0	514	0	0
485	0	0	515	0	0
486	0	0	516	0	0
487	0	0	517	0	0
488	0	0	518	0	0
489	0	0	519	0	0
490	0	0	520	0	0
491	0	0	521	0	0
492	0	0	522	0	0
493	0	0	523	0	0
494	0	0	524	0	0
495	0	0	525	0	0
496	0	0	526	0	0
497	0	0	527	0	0
498	0	0	528	0	0
499	0	0	529	0	0
500	0	0	530	0	0
501	0	0	531	0	0
502	0	0	532	0	0
503	0	0	533	0	0
504	0	0	534	0	0
505	0	0	535	0	0
506	0	0	536	0	0
507	0	0	537	0	0
508	0	0	538	0	0
509	0	0	539	0	0
510	0	0	540	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
541	0	0	571	0	0
542	0	0	572	0	0
543	0	0	573	0	0
544	0	0	574	0	0
545	0	0	575	0	0
546	0	0	576	0	0
547	0	0	577	0	0
548	0	0	578	0	0
549	0	0	579	0	0
550	0	0	580	0	0
551	0	0	581	0	0
552	0	0	582	0	0
553	0	0	583	0	0
554	0	0	584	0	0
555	0	0	585	0	0
556	0	0	586	0	0
557	0	0	587	0	0
558	0	0	588	0	0
559	0	0	589	0	0
560	0	0	590	0	0
561	0	0	591	0	0
562	0	0	592	0	0
563	0	0	593	0	0
564	0	0	594	0	0
565	0	0	595	0	0
566	0	0	596	0	0
567	0	0	597	0	0
568	0	0	598	0	0
569	0	0	599	0	0
570	0	0	600	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
601	0	0	631	0	0
602	0	0	632	0	0
603	0	0	633	0	0
604	0	0	634	0	0
605	0	0	635	0	0
606	0	0	636	0	0
607	0	0	637	0	0
608	0	0	638	0	0
609	0	0	639	0	0
610	0	0	640	0	0
611	0	0	641	0	0
612	0	0	642	0	0
613	0	0	643	0	0
614	0	0	644	0	0
615	0	0	645	0	0
616	0	0	646	0	0
617	0	0	647	0	0
618	0	0	648	0	0
619	0	0	649	0	0
620	0	0	650	0	0
621	0	0	651	0	0
622	0	0	652	0	0
623	0	0	653	0	0
624	0	0	654	0	0
625	0	0	655	0	0
626	0	0	656	0	0
627	0	0	657	0	0
628	0	0	658	0	0
629	0	0	659	0	0
630	0	0	660	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
661	0	0	691	0	0
662	0	0	692	0	0
663	0	0	693	0	0
664	0	0	694	0	0
665	0	0	695	0	0
666	0	0	696	0	0
667	0	0	697	0	0
668	0	0	698	0	0
669	0	0	699	0	0
670	0	0	700	0	0
671	0	0	701	0	0
672	0	0	702	0	0
673	0	0	703	0	0
674	0	0	704	0	0
675	0	0	705	0	0
676	0	0	706	0	0
677	0	0	707	0	0
678	0	0	708	0	0
679	0	0	709	0	0
680	0	0	710	0	0
681	0	0	711	0	0
682	0	0	712	0	0
683	0	0	713	0	0
684	0	0	714	0	0
685	0	0	715	0	0
686	0	0	716	0	0
687	0	0	717	0	0
688	0	0	718	0	0
689	0	0	719	0	0
690	0	0	720	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
721	0	0	751	0	0
722	0	0	752	0	0
723	0	0	753	0	0
724	0	0	754	0	0
725	0	0	755	0	0
726	0	0	756	0	0
727	0	0	757	0	0
728	0	0	758	0	0
729	0	0	759	0	0
730	0	0	760	0	0
731	0	0	761	0	0
732	0	0	762	0	0
733	0	0	763	0	0
734	0	0	764	0	0
735	0	0	765	0	0
736	0	0	766	0	0
737	0	0	767	0	0
738	0	0	768	0	0
739	0	0	769	0	0
740	0	0	770	0	0
741	0	0	771	0	0
742	0	0	772	0	0
743	0	0	773	0	0
744	0	0	774	0	0
745	0	0	775	0	0
746	0	0	776	0	0
747	0	0	777	0	0
748	0	0	778	0	0
749	0	0	779	0	0
750	0	0	780	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
781	0	0	811	0	0
782	0	0	812	0	0
783	0	0	813	0	0
784	0	0	814	0	0
785	0	0	815	0	0
786	0	0	816	0	0
787	0	0	817	0	0
788	0	0	818	0	0
789	0	0	819	0	0
790	0	0	820	0	0
791	0	0	821	0	0
792	0	0	822	0	0
793	0	0	823	0	0
794	0	0	824	0	0
795	0	0	825	0	0
796	0	0	826	0	0
797	0	0	827	0	0
798	0	0	828	0	0
799	0	0	829	0	0
800	0	0	830	0	0
801	0	0	831	0	0
802	0	0	832	0	0
803	0	0	833	0	0
804	0	0	834	0	0
805	0	0	835	0	0
806	0	0	836	0	0
807	0	0	837	0	0
808	0	0	838	0	0
809	0	0	839	0	0
810	0	0	840	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
841	0	0	871	0	0
842	0	0	872	0	0
843	0	0	873	0	0
844	0	0	874	0	0
845	0	0	875	0	0
846	0	0	876	0	0
847	0	0	877	0	0
848	0	0	878	0	0
849	0	0	879	0	0
850	0	0	880	0	0
851	0	0	881	0	0
852	0	0	882	0	0
853	0	0	883	0	0
854	0	0	884	0	0
855	0	0	885	0	0
856	0	0	886	0	0
857	0	0	887	0	0
858	0	0	888	0	0
859	0	0	889	0	0
860	0	0	890	0	0
861	0	0	891	0	0
862	0	0	892	0	0
863	0	0	893	0	0
864	0	0	894	0	0
865	0	0	895	0	0
866	0	0	896	0	0
867	0	0	897	0	0
868	0	0	898	0	0
869	0	0	899	0	0
870	0	0	900	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
901	0	0	931	0	0
902	0	0	932	0	0
903	0	0	933	0	0
904	0	0	934	0	0
905	0	0	935	0	0
906	0	0	936	0	0
907	0	0	937	0	0
908	0	0	938	0	0
909	0	0	939	0	0
910	0	0	940	0	0
911	0	0	941	0	0
912	0	0	942	0	0
913	0	0	943	0	0
914	0	0	944	0	0
915	0	0	945	0	0
916	0	0	946	0	0
917	0	0	947	0	0
918	0	0	948	0	0
919	0	0	949	0	0
920	0	0	950	0	0
921	0	0	951	0	0
922	0	0	952	0	0
923	0	0	953	0	0
924	0	0	954	0	0
925	0	0	955	0	0
926	0	0	956	0	0
927	0	0	957	0	0
928	0	0	958	0	0
929	0	0	959	0	0
930	0	0	960	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
961	0	0	991	0	0
962	0	0	992	0	0
963	0	0	993	0	0
964	0	0	994	0	0
965	0	0	995	0	0
966	0	0	996	0	0
967	0	0	997	0	0
968	0	0	998	0	0
969	0	0	999	0	0
970	0	0	1,000	0	0
971	0	0	1,001	0	0
972	0	0	1,002	0	0
973	0	0	1,003	0	0
974	0	0	1,004	0	0
975	0	0	1,005	0	0
976	0	0	1,006	0	0
977	0	0	1,007	0	0
978	0	0	1,008	0	0
979	0	0	1,009	0	0
980	0	0	1,010	0	0
981	0	0	1,011	0	0
982	0	0	1,012	0	0
983	0	0	1,013	0	0
984	0	0	1,014	0	0
985	0	0	1,015	0	0
986	0	0	1,016	0	0
987	0	0	1,017	0	0
988	0	0	1,018	0	0
989	0	0	1,019	0	0
990	0	0	1,020	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,021	0	0	1,051	0	0
1,022	0	0	1,052	0	0
1,023	0	0	1,053	0	0
1,024	0	0	1,054	0	0
1,025	0	0	1,055	0	0
1,026	0	0	1,056	0	0
1,027	0	0	1,057	0	0
1,028	0	0	1,058	0	0
1,029	0	0	1,059	0	0
1,030	0	0	1,060	0	0
1,031	0	0	1,061	0	0
1,032	0	0	1,062	0	0
1,033	0	0	1,063	0	0
1,034	0	0	1,064	0	0
1,035	0	0	1,065	0	0
1,036	0	0	1,066	0	0
1,037	0	0	1,067	0	0
1,038	0	0	1,068	0	0
1,039	0	0	1,069	0	0
1,040	0	0	1,070	0	0
1,041	0	0	1,071	0	0
1,042	0	0	1,072	0	0
1,043	0	0	1,073	0	0
1,044	0	0	1,074	0	0
1,045	0	0	1,075	0	0
1,046	0	0	1,076	0	0
1,047	0	0	1,077	0	0
1,048	0	0	1,078	0	0
1,049	0	0	1,079	0	0
1,050	0	0	1,080	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,081	0	0	1,111	0	0
1,082	0	0	1,112	0	0
1,083	0	0	1,113	0	0
1,084	0	0	1,114	0	0
1,085	0	0	1,115	0	0
1,086	0	0	1,116	0	0
1,087	0	0	1,117	0	0
1,088	0	0	1,118	0	0
1,089	0	0	1,119	0	0
1,090	0	0	1,120	0	0
1,091	0	0	1,121	0	0
1,092	0	0	1,122	0	0
1,093	0	0	1,123	0	0
1,094	0	0	1,124	0	0
1,095	0	0	1,125	0	0
1,096	0	0	1,126	0	0
1,097	0	0	1,127	0	0
1,098	0	0	1,128	0	0
1,099	0	0	1,129	0	0
1,100	0	0	1,130	0	0
1,101	0	0	1,131	0	0
1,102	0	0	1,132	0	0
1,103	0	0	1,133	0	0
1,104	0	0	1,134	0	0
1,105	0	0	1,135	0	0
1,106	0	0	1,136	0	0
1,107	0	0	1,137	0	0
1,108	0	0	1,138	0	0
1,109	0	0	1,139	0	0
1,110	0	0	1,140	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,141	0	0	1,171	0	0
1,142	0	0	1,172	0	0
1,143	0	0	1,173	0	0
1,144	0	0	1,174	0	0
1,145	0	0	1,175	0	0
1,146	0	0	1,176	0	0
1,147	0	0	1,177	0	0
1,148	0	0	1,178	0	0
1,149	0	0	1,179	0	0
1,150	0	0	1,180	0	0
1,151	0	0	1,181	0	0
1,152	0	0	1,182	0	0
1,153	0	0	1,183	0	0
1,154	0	0	1,184	0	0
1,155	0	0	1,185	0	0
1,156	0	0	1,186	0	0
1,157	0	0	1,187	0	0
1,158	0	0	1,188	0	0
1,159	0	0	1,189	0	0
1,160	0	0	1,190	0	0
1,161	0	0	1,191	0	0
1,162	0	0	1,192	0	0
1,163	0	0	1,193	0	0
1,164	0	0	1,194	0	0
1,165	0	0	1,195	0	0
1,166	0	0	1,196	0	0
1,167	0	0	1,197	0	0
1,168	0	0	1,198	0	0
1,169	0	0	1,199	0	0
1,170	0	0	1,200	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,201	0	0	1,231	0	0
1,202	0	0	1,232	0	0
1,203	0	0	1,233	0	0
1,204	0	0	1,234	0	0
1,205	0	0	1,235	0	0
1,206	0	0	1,236	0	0
1,207	0	0	1,237	0	0
1,208	0	0	1,238	0	0
1,209	0	0	1,239	0	0
1,210	0	0	1,240	0	0
1,211	0	0	1,241	0	0
1,212	0	0	1,242	0	0
1,213	0	0	1,243	0	0
1,214	0	0	1,244	0	0
1,215	0	0	1,245	0	0
1,216	0	0	1,246	0	0
1,217	0	0	1,247	0	0
1,218	0	0	1,248	0	0
1,219	0	0	1,249	0	0
1,220	0	0	1,250	0	0
1,221	0	0	1,251	0	0
1,222	0	0	1,252	0	0
1,223	0	0	1,253	0	0
1,224	0	0	1,254	0	0
1,225	0	0	1,255	0	0
1,226	0	0	1,256	0	0
1,227	0	0	1,257	0	0
1,228	0	0	1,258	0	0
1,229	0	0	1,259	0	0
1,230	0	0	1,260	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,261	0	0	1,291	0	0
1,262	0	0	1,292	0	0
1,263	0	0	1,293	0	0
1,264	0	0	1,294	0	0
1,265	0	0	1,295	0	0
1,266	0	0	1,296	0	0
1,267	0	0	1,297	0	0
1,268	0	0	1,298	0	0
1,269	0	0	1,299	0	0
1,270	0	0	1,300	0	0
1,271	0	0	1,301	0	0
1,272	0	0	1,302	0	0
1,273	0	0	1,303	0	0
1,274	0	0	1,304	0	0
1,275	0	0	1,305	0	0
1,276	0	0	1,306	0	0
1,277	0	0	1,307	0	0
1,278	0	0	1,308	0	0
1,279	0	0	1,309	0	0
1,280	0	0	1,310	0	0
1,281	0	0	1,311	0	0
1,282	0	0	1,312	0	0
1,283	0	0	1,313	0	0
1,284	0	0	1,314	0	0
1,285	0	0	1,315	0	0
1,286	0	0	1,316	0	0
1,287	0	0	1,317	0	0
1,288	0	0	1,318	0	0
1,289	0	0	1,319	0	0
1,290	0	0	1,320	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,321	0	0	1,351	0	0
1,322	0	0	1,352	0	0
1,323	0	0	1,353	0	0
1,324	0	0	1,354	0	0
1,325	0	0	1,355	0	0
1,326	0	0	1,356	0	0
1,327	0	0	1,357	0	0
1,328	0	0	1,358	0	0
1,329	0	0	1,359	0	0
1,330	0	0	1,360	0	0
1,331	0	0	1,361	0	0
1,332	0	0	1,362	0	0
1,333	0	0	1,363	0	0
1,334	0	0	1,364	0	0
1,335	0	0	1,365	0	0
1,336	0	0	1,366	0	0
1,337	0	0	1,367	0	0
1,338	0	0	1,368	0	0
1,339	0	0	1,369	0	0
1,340	0	0	1,370	0	0
1,341	0	0	1,371	0	0
1,342	0	0	1,372	0	0
1,343	0	0	1,373	0	0
1,344	0	0	1,374	0	0
1,345	0	0	1,375	0	0
1,346	0	0	1,376	0	0
1,347	0	0	1,377	0	0
1,348	0	0	1,378	0	0
1,349	0	0	1,379	0	0
1,350	0	0	1,380	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,381	0	0	1,411	0	0
1,382	0	0	1,412	0	0
1,383	0	0	1,413	0	0
1,384	0	0	1,414	0	0
1,385	0	0	1,415	0	0
1,386	0	0	1,416	0	0
1,387	0	0	1,417	0	0
1,388	0	0	1,418	0	0
1,389	0	0	1,419	0	0
1,390	0	0	1,420	0	0
1,391	0	0	1,421	0	0
1,392	0	0	1,422	0	0
1,393	0	0	1,423	0	0
1,394	0	0	1,424	0	0
1,395	0	0	1,425	0	0
1,396	0	0	1,426	0	0
1,397	0	0	1,427	0	0
1,398	0	0	1,428	0	0
1,399	0	0	1,429	0	0
1,400	0	0	1,430	0	0
1,401	0	0	1,431	0	0
1,402	0	0	1,432	0	0
1,403	0	0	1,433	0	0
1,404	0	0	1,434	0	0
1,405	0	0	1,435	0	0
1,406	0	0	1,436	0	0
1,407	0	0	1,437	0	0
1,408	0	0	1,438	0	0
1,409	0	0	1,439	0	0
1,410	0	0	1,440	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,441	0	0	1,471	0	0
1,442	0	0	1,472	0	0
1,443	0	0	1,473	0	0
1,444	0	0	1,474	0	0
1,445	0	0	1,475	0	0
1,446	0	0	1,476	0	0
1,447	0	0	1,477	0	0
1,448	0	0	1,478	0	0
1,449	0	0	1,479	0	0
1,450	0	0	1,480	0	0
1,451	0	0	1,481	0	0
1,452	0	0	1,482	0	0
1,453	0	0	1,483	0	0
1,454	0	0	1,484	0	0
1,455	0	0	1,485	0	0
1,456	0	0	1,486	0	0
1,457	0	0	1,487	0	0
1,458	0	0	1,488	0	0
1,459	0	0	1,489	0	0
1,460	0	0	1,490	0	0
1,461	0	0	1,491	0	0
1,462	0	0	1,492	0	0
1,463	0	0	1,493	0	0
1,464	0	0	1,494	0	0
1,465	0	0	1,495	0	0
1,466	0	0	1,496	0	0
1,467	0	0	1,497	0	0
1,468	0	0	1,498	0	0
1,469	0	0	1,499	0	0
1,470	0	0	1,500	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,501	0	0	1,531	0	0
1,502	0	0	1,532	0	0
1,503	0	0	1,533	0	0
1,504	0	0	1,534	0	0
1,505	0	0	1,535	0	0
1,506	0	0	1,536	0	0
1,507	0	0	1,537	0	0
1,508	0	0	1,538	0	0
1,509	0	0	1,539	0	0
1,510	0	0	1,540	0	0
1,511	0	0	1,541	0	0
1,512	0	0	1,542	0	0
1,513	0	0	1,543	0	0
1,514	0	0	1,544	0	0
1,515	0	0	1,545	0	0
1,516	0	0	1,546	0	0
1,517	0	0	1,547	0	0
1,518	0	0	1,548	0	0
1,519	0	0	1,549	0	0
1,520	0	0	1,550	0	0
1,521	0	0	1,551	0	0
1,522	0	0	1,552	0	0
1,523	0	0	1,553	0	11
1,524	0	0	1,554	0	12
1,525	0	0	1,555	0	13
1,526	0	0	1,556	0	13
1,527	0	0	1,557	0	11
1,528	0	0	1,558	0	11
1,529	0	0	1,559	0	12
1,530	0	0	1,560	0	13

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,561	0	14	1,591	25	26
1,562	0	23	1,592	23	24
1,563	0	29	1,593	19	21
1,564	0	29	1,594	14	21
1,565	0	27	1,595	8	22
1,566	4	26	1,596	4	20
1,567	7	25	1,597	0	15
1,568	10	24	1,598	0	13
1,569	12	24	1,599	0	14
1,570	15	24	1,600	0	16
1,571	18	23	1,601	0	17
1,572	22	20	1,602	0	18
1,573	26	17	1,603	0	17
1,574	30	16	1,604	0	12
1,575	34	15	1,605	0	0
1,576	37	13	1,606	0	0
1,577	39	12	1,607	0	0
1,578	40	11	1,608	0	0
1,579	40	12	1,609	0	0
1,580	41	13	1,610	0	0
1,581	41	13	1,611	0	0
1,582	42	11	1,612	0	0
1,583	42	9	1,613	0	0
1,584	40	10	1,614	0	0
1,585	37	13	1,615	0	0
1,586	33	17	1,616	0	10
1,587	30	19	1,617	2	12
1,588	29	20	1,618	5	12
1,589	29	21	1,619	8	11
1,590	27	24	1,620	9	9

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,621	9	8	1,651	0	0
1,622	9	7	1,652	0	0
1,623	9	7	1,653	0	0
1,624	9	8	1,654	0	0
1,625	9	8	1,655	0	0
1,626	9	8	1,656	0	0
1,627	9	8	1,657	0	0
1,628	9	7	1,658	0	0
1,629	9	7	1,659	0	0
1,630	9	7	1,660	0	0
1,631	9	7	1,661	0	0
1,632	9	8	1,662	0	0
1,633	9	8	1,663	0	0
1,634	8	7	1,664	0	0
1,635	6	7	1,665	0	0
1,636	3	10	1,666	0	0
1,637	0	13	1,667	0	0
1,638	0	14	1,668	0	0
1,639	0	11	1,669	0	0
1,640	0	11	1,670	0	0
1,641	0	11	1,671	0	0
1,642	0	12	1,672	0	0
1,643	0	12	1,673	0	0
1,644	0	12	1,674	0	0
1,645	0	13	1,675	0	0
1,646	0	15	1,676	0	0
1,647	0	17	1,677	0	0
1,648	0	20	1,678	0	0
1,649	0	20	1,679	0	0
1,650	0	14	1,680	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,681	0	0	1,711	0	0
1,682	0	0	1,712	0	0
1,683	0	0	1,713	0	0
1,684	0	0	1,714	0	0
1,685	0	0	1,715	0	0
1,686	0	0	1,716	0	0
1,687	0	0	1,717	0	0
1,688	0	0	1,718	0	0
1,689	0	0	1,719	0	0
1,690	0	0	1,720	0	0
1,691	0	0	1,721	0	0
1,692	0	0	1,722	0	0
1,693	0	0	1,723	0	0
1,694	0	0	1,724	0	0
1,695	0	0	1,725	0	0
1,696	0	0	1,726	0	0
1,697	0	0	1,727	0	12
1,698	0	0	1,728	0	18
1,699	0	0	1,729	6	19
1,700	0	0	1,730	22	19
1,701	0	0	1,731	39	17
1,702	0	0	1,732	50	13
1,703	0	0	1,733	51	9
1,704	0	0	1,734	50	7
1,705	0	0	1,735	46	7
1,706	0	0	1,736	41	9
1,707	0	0	1,737	41	13
1,708	0	0	1,738	47	14
1,709	0	0	1,739	48	9
1,710	0	0	1,740	41	4

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,741	36	5	1,771	48	12
1,742	39	9	1,772	48	12
1,743	46	12	1,773	48	12
1,744	51	12	1,774	48	11
1,745	54	11	1,775	48	11
1,746	56	10	1,776	48	11
1,747	58	10	1,777	48	11
1,748	60	11	1,778	48	12
1,749	61	11	1,779	48	12
1,750	62	11	1,780	48	11
1,751	62	12	1,781	48	9
1,752	62	12	1,782	46	8
1,753	62	12	1,783	44	8
1,754	62	12	1,784	43	9
1,755	62	12	1,785	42	10
1,756	62	14	1,786	42	11
1,757	64	19	1,787	41	11
1,758	70	22	1,788	41	11
1,759	76	19	1,789	41	10
1,760	73	9	1,790	41	10
1,761	59	3	1,791	41	10
1,762	44	5	1,792	41	10
1,763	38	12	1,793	42	10
1,764	40	15	1,794	42	10
1,765	44	14	1,795	42	10
1,766	47	13	1,796	42	10
1,767	48	12	1,797	42	9
1,768	48	12	1,798	42	9
1,769	48	12	1,799	42	10
1,770	48	12	1,800	43	11

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,801	44	12	1,831	39	9
1,802	47	14	1,832	36	8
1,803	49	15	1,833	33	7
1,804	52	15	1,834	28	5
1,805	53	14	1,835	20	2
1,806	53	13	1,836	10	3
1,807	54	12	1,837	4	6
1,808	53	10	1,838	0	0
1,809	52	9	1,839	0	0
1,810	50	10	1,840	0	0
1,811	48	10	1,841	0	0
1,812	47	10	1,842	0	0
1,813	47	10	1,843	0	0
1,814	46	11	1,844	0	0
1,815	46	11	1,845	0	0
1,816	46	10	1,846	0	0
1,817	45	9	1,847	0	0
1,818	43	9	1,848	0	0
1,819	42	9	1,849	0	0
1,820	41	9	1,850	0	0
1,821	40	10	1,851	0	0
1,822	40	11	1,852	0	0
1,823	40	12	1,853	0	0
1,824	41	11	1,854	0	0
1,825	42	11	1,855	0	0
1,826	43	11	1,856	0	0
1,827	43	12	1,857	0	0
1,828	43	11	1,858	0	0
1,829	42	11	1,859	0	0
1,830	41	9	1,860	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,861	0	0	1,891	0	0
1,862	0	0	1,892	0	0
1,863	0	0	1,893	0	0
1,864	0	0	1,894	0	0
1,865	0	0	1,895	0	0
1,866	0	0	1,896	0	0
1,867	0	0	1,897	0	0
1,868	0	0	1,898	0	0
1,869	0	0	1,899	0	0
1,870	0	0	1,900	0	0
1,871	0	0	1,901	0	0
1,872	0	0	1,902	0	0
1,873	0	0	1,903	0	0
1,874	0	0	1,904	0	0
1,875	0	0	1,905	0	0
1,876	0	0	1,906	0	0
1,877	0	0	1,907	0	0
1,878	0	0	1,908	0	0
1,879	0	0	1,909	0	0
1,880	0	0	1,910	0	0
1,881	0	0	1,911	0	0
1,882	0	0	1,912	0	0
1,883	0	0	1,913	0	0
1,884	0	0	1,914	0	0
1,885	0	0	1,915	0	0
1,886	0	0	1,916	0	0
1,887	0	0	1,917	0	0
1,888	0	0	1,918	0	0
1,889	0	0	1,919	0	0
1,890	0	0	1,920	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,921	0	0	1,951	0	0
1,922	0	0	1,952	0	0
1,923	0	0	1,953	0	0
1,924	0	0	1,954	0	0
1,925	0	0	1,955	0	0
1,926	0	0	1,956	0	0
1,927	0	0	1,957	0	0
1,928	0	0	1,958	0	0
1,929	0	0	1,959	0	0
1,930	0	0	1,960	0	0
1,931	0	0	1,961	0	0
1,932	0	0	1,962	0	0
1,933	0	0	1,963	0	0
1,934	0	0	1,964	0	0
1,935	0	0	1,965	0	0
1,936	0	0	1,966	0	0
1,937	0	0	1,967	0	0
1,938	0	0	1,968	0	0
1,939	0	0	1,969	0	0
1,940	0	0	1,970	0	0
1,941	0	0	1,971	0	0
1,942	0	0	1,972	0	0
1,943	0	0	1,973	0	0
1,944	0	0	1,974	0	0
1,945	0	0	1,975	0	0
1,946	0	0	1,976	0	0
1,947	0	0	1,977	0	0
1,948	0	0	1,978	0	0
1,949	0	0	1,979	0	0
1,950	0	0	1,980	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
1,981	0	0	2,011	0	0
1,982	0	0	2,012	0	0
1,983	0	0	2,013	0	0
1,984	0	0	2,014	0	17
1,985	0	0	2,015	7	33
1,986	0	0	2,016	27	47
1,987	0	0	2,017	57	47
1,988	0	0	2,018	85	40
1,989	0	0	2,019	99	36
1,990	0	0	2,020	102	41
1,991	0	0	2,021	101	46
1,992	0	0	2,022	100	41
1,993	0	0	2,023	100	33
1,994	0	0	2,024	100	32
1,995	0	0	2,025	100	36
1,996	0	0	2,026	100	40
1,997	0	0	2,027	101	37
1,998	0	0	2,028	101	34
1,999	0	0	2,029	101	39
2,000	0	0	2,030	102	51
2,001	0	0	2,031	101	53
2,002	0	0	2,032	99	40
2,003	0	0	2,033	99	23
2,004	0	0	2,034	100	14
2,005	0	0	2,035	100	12
2,006	0	0	2,036	101	13
2,007	0	0	2,037	95	11
2,008	0	0	2,038	72	7
2,009	0	0	2,039	38	5
2,010	0	0	2,040	11	8

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,041	0	0	2,071	100	18
2,042	0	0	2,072	100	21
2,043	0	0	2,073	100	23
2,044	0	0	2,074	100	22
2,045	0	0	2,075	101	22
2,046	0	0	2,076	101	23
2,047	0	0	2,077	100	22
2,048	0	0	2,078	100	18
2,049	0	0	2,079	100	15
2,050	0	16	2,080	101	14
2,051	11	24	2,081	99	12
2,052	40	27	2,082	86	7
2,053	74	26	2,083	58	3
2,054	96	23	2,084	25	5
2,055	101	19	2,085	5	10
2,056	100	18	2,086	0	0
2,057	100	17	2,087	0	0
2,058	100	15	2,088	0	0
2,059	100	14	2,089	0	0
2,060	100	13	2,090	0	0
2,061	100	13	2,091	0	0
2,062	100	14	2,092	0	0
2,063	100	14	2,093	0	0
2,064	100	14	2,094	0	0
2,065	100	14	2,095	0	0
2,066	100	14	2,096	0	0
2,067	100	14	2,097	0	0
2,068	100	14	2,098	0	0
2,069	100	14	2,099	0	0
2,070	100	15	2,100	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,101	0	0	2,131	89	33
2,102	0	0	2,132	100	28
2,103	0	0	2,133	101	23
2,104	0	0	2,134	100	19
2,105	0	0	2,135	100	18
2,106	0	0	2,136	100	17
2,107	0	0	2,137	100	17
2,108	0	0	2,138	100	18
2,109	0	0	2,139	100	18
2,110	0	0	2,140	100	17
2,111	0	0	2,141	100	16
2,112	0	0	2,142	100	16
2,113	0	0	2,143	100	15
2,114	4	17	2,144	100	15
2,115	23	25	2,145	100	16
2,116	56	28	2,146	100	19
2,117	85	27	2,147	100	23
2,118	99	22	2,148	100	25
2,119	101	19	2,149	100	23
2,120	101	19	2,150	100	18
2,121	94	17	2,151	100	15
2,122	71	12	2,152	100	14
2,123	37	9	2,153	100	14
2,124	9	10	2,154	100	15
2,125	0	0	2,155	100	18
2,126	0	0	2,156	99	21
2,127	0	0	2,157	100	23
2,128	6	17	2,158	100	21
2,129	28	25	2,159	100	18
2,130	62	31	2,160	100	17

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,161	100	16	2,191	101	15
2,162	100	17	2,192	95	13
2,163	100	21	2,193	72	9
2,164	100	25	2,194	38	7
2,165	100	29	2,195	10	9
2,166	100	31	2,196	0	15
2,167	100	30	2,197	7	25
2,168	100	25	2,198	35	28
2,169	100	20	2,199	72	26
2,170	100	18	2,200	96	22
2,171	100	19	2,201	102	19
2,172	100	21	2,202	101	18
2,173	100	23	2,203	100	17
2,174	100	24	2,204	100	17
2,175	100	25	2,205	100	17
2,176	100	25	2,206	100	16
2,177	100	25	2,207	100	16
2,178	100	24	2,208	100	15
2,179	100	23	2,209	100	15
2,180	100	22	2,210	100	15
2,181	100	22	2,211	100	15
2,182	100	22	2,212	98	13
2,183	100	22	2,213	85	8
2,184	100	22	2,214	56	4
2,185	100	22	2,215	24	6
2,186	100	21	2,216	4	10
2,187	100	18	2,217	0	0
2,188	100	16	2,218	0	0
2,189	100	15	2,219	0	0
2,190	100	14	2,220	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,221	0	0	2,251	100	22
2,222	0	0	2,252	100	20
2,223	0	0	2,253	100	19
2,224	0	0	2,254	100	18
2,225	0	0	2,255	100	17
2,226	0	0	2,256	100	16
2,227	0	0	2,257	100	16
2,228	0	0	2,258	100	16
2,229	0	0	2,259	100	16
2,230	0	0	2,260	100	15
2,231	0	17	2,261	100	15
2,232	14	24	2,262	100	15
2,233	43	26	2,263	98	13
2,234	77	25	2,264	84	8
2,235	97	23	2,265	55	4
2,236	101	21	2,266	23	5
2,237	100	21	2,267	3	10
2,238	100	21	2,268	0	0
2,239	100	21	2,269	3	17
2,240	100	20	2,270	22	23
2,241	100	20	2,271	53	25
2,242	100	19	2,272	84	24
2,243	100	18	2,273	99	19
2,244	100	18	2,274	102	16
2,245	100	18	2,275	100	13
2,246	100	19	2,276	90	7
2,247	100	21	2,277	64	3
2,248	100	23	2,278	30	4
2,249	100	24	2,279	6	9
2,250	100	24	2,280	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,281	0	0	2,311	100	14
2,282	0	0	2,312	100	14
2,283	0	0	2,313	100	14
2,284	0	0	2,314	100	14
2,285	7	16	2,315	100	14
2,286	34	17	2,316	100	15
2,287	70	20	2,317	100	16
2,288	95	23	2,318	100	16
2,289	101	22	2,319	100	16
2,290	101	20	2,320	100	16
2,291	100	20	2,321	100	20
2,292	100	19	2,322	100	26
2,293	100	18	2,323	100	33
2,294	100	17	2,324	100	37
2,295	100	15	2,325	100	38
2,296	100	14	2,326	100	36
2,297	100	14	2,327	100	30
2,298	100	14	2,328	100	23
2,299	100	14	2,329	100	18
2,300	100	14	2,330	100	15
2,301	100	14	2,331	100	15
2,302	100	14	2,332	101	15
2,303	100	14	2,333	97	13
2,304	100	14	2,334	81	8
2,305	100	14	2,335	51	4
2,306	100	14	2,336	20	6
2,307	100	15	2,337	3	10
2,308	100	15	2,338	0	0
2,309	100	15	2,339	0	0
2,310	100	14	2,340	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,341	0	0	2,371	0	0
2,342	0	0	2,372	0	0
2,343	0	0	2,373	0	0
2,344	0	0	2,374	0	0
2,345	0	0	2,375	0	0
2,346	0	0	2,376	0	0
2,347	0	0	2,377	0	0
2,348	0	0	2,378	0	0
2,349	0	0	2,379	0	0
2,350	0	0	2,380	0	0
2,351	0	0	2,381	0	0
2,352	0	0	2,382	0	0
2,353	0	0	2,383	0	0
2,354	0	0	2,384	0	0
2,355	0	0	2,385	0	0
2,356	0	0	2,386	0	0
2,357	0	0	2,387	0	0
2,358	0	0	2,388	0	0
2,359	0	0	2,389	0	0
2,360	0	0	2,390	0	0
2,361	0	0	2,391	0	0
2,362	0	0	2,392	0	0
2,363	0	0	2,393	0	0
2,364	0	0	2,394	0	0
2,365	0	0	2,395	0	0
2,366	0	0	2,396	0	0
2,367	0	0	2,397	0	0
2,368	0	0	2,398	0	0
2,369	0	0	2,399	0	0
2,370	0	0	2,400	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,401	0	0	2,431	0	0
2,402	0	0	2,432	0	0
2,403	0	0	2,433	0	0
2,404	0	0	2,434	0	0
2,405	0	0	2,435	0	0
2,406	0	0	2,436	0	0
2,407	0	0	2,437	0	0
2,408	0	0	2,438	0	0
2,409	0	0	2,439	0	0
2,410	0	0	2,440	0	0
2,411	0	0	2,441	0	0
2,412	0	0	2,442	0	0
2,413	0	0	2,443	0	0
2,414	0	0	2,444	0	0
2,415	0	0	2,445	0	0
2,416	0	0	2,446	0	0
2,417	0	0	2,447	0	0
2,418	0	0	2,448	0	0
2,419	0	0	2,449	0	0
2,420	0	0	2,450	0	0
2,421	0	0	2,451	0	0
2,422	0	0	2,452	0	0
2,423	0	0	2,453	0	0
2,424	0	0	2,454	0	0
2,425	0	0	2,455	0	0
2,426	0	0	2,456	0	0
2,427	0	0	2,457	0	0
2,428	0	0	2,458	0	0
2,429	0	0	2,459	0	0
2,430	0	0	2,460	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,461	0	0	2,491	7	15
2,462	0	0	2,492	6	13
2,463	0	0	2,493	2	12
2,464	0	0	2,494	0	0
2,465	3	13	2,495	0	0
2,466	9	23	2,496	0	0
2,467	17	30	2,497	0	0
2,468	26	30	2,498	0	0
2,469	29	25	2,499	0	0
2,470	25	22	2,500	0	0
2,471	20	20	2,501	0	0
2,472	18	18	2,502	0	0
2,473	15	15	2,503	0	0
2,474	12	13	2,504	0	0
2,475	10	11	2,505	0	0
2,476	9	11	2,506	0	14
2,477	9	12	2,507	0	15
2,478	10	14	2,508	0	15
2,479	11	15	2,509	0	16
2,480	11	15	2,510	6	20
2,481	9	13	2,511	16	26
2,482	4	12	2,512	33	31
2,483	0	12	2,513	49	33
2,484	0	13	2,514	57	33
2,485	0	15	2,515	58	33
2,486	2	18	2,516	55	30
2,487	5	19	2,517	50	26
2,488	7	18	2,518	48	28
2,489	8	16	2,519	52	39
2,490	8	15	2,520	59	45

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,521	63	39	2,551	10	21
2,522	62	31	2,552	18	23
2,523	61	30	2,553	26	22
2,524	60	32	2,554	30	21
2,525	59	30	2,555	30	20
2,526	56	27	2,556	28	19
2,527	52	23	2,557	24	18
2,528	49	26	2,558	20	16
2,529	50	34	2,559	14	15
2,530	56	40	2,560	6	16
2,531	62	40	2,561	0	18
2,532	63	36	2,562	0	20
2,533	61	30	2,563	0	21
2,534	54	20	2,564	0	21
2,535	42	11	2,565	0	22
2,536	27	7	2,566	0	24
2,537	16	9	2,567	0	27
2,538	11	13	2,568	0	25
2,539	10	18	2,569	0	21
2,540	8	23	2,570	0	16
2,541	5	24	2,571	0	15
2,542	4	21	2,572	0	15
2,543	5	16	2,573	0	14
2,544	5	14	2,574	0	12
2,545	3	13	2,575	0	0
2,546	3	14	2,576	0	0
2,547	3	16	2,577	0	0
2,548	5	17	2,578	0	0
2,549	6	17	2,579	0	0
2,550	7	18	2,580	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,581	0	0	2,611	0	0
2,582	0	0	2,612	0	0
2,583	0	0	2,613	0	0
2,584	0	0	2,614	0	0
2,585	0	0	2,615	0	0
2,586	0	0	2,616	0	0
2,587	0	0	2,617	0	0
2,588	0	0	2,618	0	0
2,589	0	0	2,619	0	0
2,590	0	0	2,620	0	0
2,591	0	0	2,621	0	0
2,592	0	0	2,622	0	0
2,593	0	0	2,623	0	0
2,594	0	0	2,624	0	0
2,595	0	0	2,625	0	0
2,596	0	0	2,626	0	0
2,597	0	0	2,627	0	0
2,598	0	0	2,628	0	0
2,599	0	0	2,629	0	0
2,600	0	0	2,630	0	0
2,601	0	0	2,631	0	0
2,602	0	0	2,632	0	0
2,603	0	0	2,633	0	0
2,604	0	0	2,634	0	0
2,605	0	0	2,635	0	0
2,606	0	0	2,636	0	0
2,607	0	0	2,637	0	0
2,608	0	0	2,638	0	0
2,609	0	0	2,639	0	0
2,610	0	0	2,640	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,641	0	0	2,671	0	0
2,642	0	0	2,672	0	0
2,643	0	0	2,673	0	0
2,644	0	0	2,674	0	0
2,645	0	0	2,675	0	0
2,646	0	0	2,676	0	0
2,647	0	0	2,677	0	0
2,648	0	0	2,678	0	0
2,649	0	0	2,679	0	0
2,650	0	0	2,680	0	0
2,651	0	0	2,681	0	0
2,652	0	0	2,682	0	0
2,653	0	0	2,683	0	0
2,654	0	0	2,684	0	0
2,655	0	0	2,685	0	0
2,656	0	0	2,686	0	0
2,657	0	0	2,687	0	0
2,658	0	0	2,688	0	0
2,659	0	0	2,689	0	0
2,660	0	0	2,690	0	0
2,661	0	0	2,691	0	0
2,662	0	0	2,692	0	0
2,663	0	0	2,693	0	0
2,664	0	0	2,694	0	0
2,665	0	0	2,695	0	0
2,666	0	0	2,696	0	0
2,667	0	0	2,697	0	0
2,668	0	0	2,698	0	0
2,669	0	0	2,699	0	0
2,670	0	0	2,700	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,701	0	0	2,731	0	0
2,702	0	0	2,732	0	13
2,703	0	0	2,733	7	19
2,704	0	0	2,734	19	25
2,705	0	0	2,735	31	29
2,706	0	0	2,736	39	29
2,707	0	0	2,737	39	26
2,708	0	0	2,738	35	23
2,709	0	0	2,739	28	21
2,710	0	0	2,740	20	19
2,711	0	0	2,741	15	17
2,712	0	0	2,742	16	16
2,713	0	0	2,743	24	19
2,714	0	0	2,744	33	21
2,715	0	0	2,745	36	18
2,716	0	0	2,746	32	16
2,717	0	0	2,747	30	20
2,718	0	0	2,748	35	31
2,719	0	0	2,749	43	38
2,720	0	0	2,750	45	36
2,721	0	0	2,751	37	26
2,722	0	0	2,752	23	17
2,723	0	0	2,753	18	18
2,724	0	0	2,754	27	26
2,725	0	0	2,755	41	31
2,726	0	0	2,756	46	30
2,727	0	0	2,757	35	24
2,728	0	0	2,758	19	19
2,729	0	0	2,759	16	17
2,730	0	0	2,760	26	18

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,761	32	16	2,791	0	0
2,762	25	11	2,792	0	0
2,763	12	7	2,793	0	0
2,764	3	8	2,794	0	0
2,765	0	0	2,795	0	0
2,766	0	0	2,796	0	0
2,767	0	0	2,797	0	0
2,768	0	0	2,798	0	0
2,769	0	0	2,799	0	0
2,770	0	0	2,800	0	0
2,771	0	0	2,801	0	0
2,772	0	0	2,802	0	0
2,773	0	0	2,803	0	0
2,774	0	0	2,804	0	0
2,775	0	0	2,805	0	0
2,776	0	0	2,806	0	0
2,777	0	0	2,807	0	0
2,778	0	0	2,808	0	0
2,779	0	0	2,809	0	0
2,780	0	0	2,810	0	0
2,781	0	0	2,811	0	0
2,782	0	0	2,812	0	0
2,783	0	0	2,813	0	0
2,784	0	0	2,814	0	0
2,785	0	0	2,815	0	0
2,786	0	0	2,816	0	0
2,787	0	0	2,817	0	0
2,788	0	0	2,818	0	0
2,789	0	0	2,819	0	0
2,790	0	0	2,820	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,821	0	0	2,851	0	0
2,822	0	0	2,852	0	0
2,823	0	0	2,853	0	0
2,824	0	0	2,854	0	0
2,825	0	0	2,855	0	0
2,826	0	0	2,856	0	0
2,827	0	0	2,857	0	0
2,828	0	0	2,858	0	0
2,829	0	0	2,859	0	0
2,830	0	0	2,860	0	0
2,831	0	0	2,861	0	0
2,832	0	0	2,862	0	0
2,833	0	0	2,863	0	0
2,834	0	0	2,864	0	0
2,835	0	0	2,865	0	0
2,836	0	0	2,866	0	0
2,837	0	0	2,867	0	0
2,838	0	0	2,868	0	0
2,839	0	0	2,869	0	0
2,840	0	0	2,870	0	0
2,841	0	0	2,871	0	0
2,842	0	0	2,872	0	0
2,843	0	0	2,873	0	0
2,844	0	0	2,874	0	0
2,845	0	0	2,875	0	0
2,846	0	0	2,876	0	0
2,847	0	0	2,877	0	0
2,848	0	0	2,878	0	0
2,849	0	0	2,879	0	0
2,850	0	0	2,880	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,881	0	0	2,911	80	50
2,882	0	0	2,912	83	50
2,883	0	0	2,913	84	50
2,884	0	0	2,914	84	49
2,885	0	0	2,915	83	47
2,886	0	0	2,916	82	47
2,887	4	13	2,917	84	49
2,888	13	21	2,918	87	54
2,889	26	29	2,919	92	58
2,890	37	31	2,920	93	57
2,891	40	26	2,921	90	52
2,892	33	20	2,922	86	48
2,893	21	16	2,923	85	48
2,894	13	17	2,924	85	50
2,895	11	18	2,925	84	51
2,896	15	20	2,926	83	48
2,897	21	23	2,927	82	44
2,898	29	25	2,928	79	41
2,899	36	25	2,929	75	39
2,900	43	27	2,930	69	35
2,901	50	31	2,931	59	28
2,902	57	34	2,932	49	23
2,903	62	34	2,933	44	25
2,904	63	32	2,934	44	32
2,905	64	34	2,935	45	36
2,906	67	40	2,936	47	35
2,907	72	46	2,937	49	31
2,908	75	49	2,938	49	31
2,909	77	50	2,939	44	34
2,910	78	49	2,940	39	37

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
2,941	33	33	2,971	12	17
2,942	26	24	2,972	12	17
2,943	16	16	2,973	12	17
2,944	8	14	2,974	12	17
2,945	12	19	2,975	12	18
2,946	23	25	2,976	13	18
2,947	29	25	2,977	13	17
2,948	27	22	2,978	11	14
2,949	24	19	2,979	8	12
2,950	22	18	2,980	3	12
2,951	19	16	2,981	0	12
2,952	14	13	2,982	0	0
2,953	11	14	2,983	0	0
2,954	8	17	2,984	0	0
2,955	7	20	2,985	0	0
2,956	7	22	2,986	0	0
2,957	8	22	2,987	0	0
2,958	8	21	2,988	0	0
2,959	10	20	2,989	0	0
2,960	12	19	2,990	0	0
2,961	12	20	2,991	0	0
2,962	12	20	2,992	0	0
2,963	12	19	2,993	0	0
2,964	12	17	2,994	0	0
2,965	11	17	2,995	0	0
2,966	10	17	2,996	0	0
2,967	11	17	2,997	0	0
2,968	11	17	2,998	0	0
2,969	12	18	2,999	0	0
2,970	12	18	3,000	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,001	0	0	3,031	9	13
3,002	0	0	3,032	4	12
3,003	0	0	3,033	0	12
3,004	0	0	3,034	0	13
3,005	0	0	3,035	0	15
3,006	0	0	3,036	2	18
3,007	0	0	3,037	5	19
3,008	0	0	3,038	7	18
3,009	0	0	3,039	8	16
3,010	0	0	3,040	8	15
3,011	0	0	3,041	7	15
3,012	0	0	3,042	6	13
3,013	0	0	3,043	2	12
3,014	0	0	3,044	0	0
3,015	3	13	3,045	0	0
3,016	9	23	3,046	0	0
3,017	17	30	3,047	0	0
3,018	26	30	3,048	0	0
3,019	29	25	3,049	0	0
3,020	25	22	3,050	0	0
3,021	20	20	3,051	0	0
3,022	18	18	3,052	0	0
3,023	15	15	3,053	0	0
3,024	12	13	3,054	0	0
3,025	10	11	3,055	0	0
3,026	9	11	3,056	0	14
3,027	9	12	3,057	0	15
3,028	10	14	3,058	0	15
3,029	11	15	3,059	0	16
3,030	11	15	3,060	6	20

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,061	16	26	3,091	5	24
3,062	33	31	3,092	4	21
3,063	49	33	3,093	5	16
3,064	57	33	3,094	5	14
3,065	58	33	3,095	3	13
3,066	55	30	3,096	3	14
3,067	50	26	3,097	3	16
3,068	48	28	3,098	5	17
3,069	52	39	3,099	6	17
3,070	59	45	3,100	7	18
3,071	63	39	3,101	10	21
3,072	62	31	3,102	18	23
3,073	61	30	3,103	26	22
3,074	60	32	3,104	30	21
3,075	59	30	3,105	30	20
3,076	56	27	3,106	28	19
3,077	52	23	3,107	24	18
3,078	49	26	3,108	20	16
3,079	50	34	3,109	14	15
3,080	56	40	3,110	6	16
3,081	62	40	3,111	0	18
3,082	63	36	3,112	0	20
3,083	61	30	3,113	0	21
3,084	54	20	3,114	0	21
3,085	42	11	3,115	0	22
3,086	27	7	3,116	0	24
3,087	16	9	3,117	0	27
3,088	11	13	3,118	0	25
3,089	10	18	3,119	0	21
3,090	8	23	3,120	0	16

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,121	0	15	3,151	0	0
3,122	0	15	3,152	0	0
3,123	0	14	3,153	0	0
3,124	0	12	3,154	0	0
3,125	0	0	3,155	0	0
3,126	0	0	3,156	0	0
3,127	0	0	3,157	0	0
3,128	0	0	3,158	0	0
3,129	0	0	3,159	0	0
3,130	0	0	3,160	0	0
3,131	0	0	3,161	0	0
3,132	0	0	3,162	0	0
3,133	0	0	3,163	0	0
3,134	0	0	3,164	0	0
3,135	0	0	3,165	0	0
3,136	0	0	3,166	0	0
3,137	0	0	3,167	0	0
3,138	0	0	3,168	0	0
3,139	0	0	3,169	0	0
3,140	0	0	3,170	0	0
3,141	0	0	3,171	0	0
3,142	0	0	3,172	0	0
3,143	0	0	3,173	0	0
3,144	0	0	3,174	0	0
3,145	0	0	3,175	0	0
3,146	0	0	3,176	0	0
3,147	0	0	3,177	0	0
3,148	0	0	3,178	0	0
3,149	0	0	3,179	0	0
3,150	0	0	3,180	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,181	0	0	3,211	0	0
3,182	0	0	3,212	0	0
3,183	0	0	3,213	0	0
3,184	0	0	3,214	0	0
3,185	0	0	3,215	0	0
3,186	0	0	3,216	0	0
3,187	0	0	3,217	0	0
3,188	0	0	3,218	0	0
3,189	0	0	3,219	0	0
3,190	0	0	3,220	0	0
3,191	0	0	3,221	0	0
3,192	0	0	3,222	0	0
3,193	0	0	3,223	0	0
3,194	0	0	3,224	0	0
3,195	0	0	3,225	0	0
3,196	0	0	3,226	0	0
3,197	0	0	3,227	0	0
3,198	0	0	3,228	0	0
3,199	0	0	3,229	0	0
3,200	0	0	3,230	0	0
3,201	0	0	3,231	0	0
3,202	0	0	3,232	0	0
3,203	0	0	3,233	0	0
3,204	0	0	3,234	0	0
3,205	0	0	3,235	0	0
3,206	0	0	3,236	0	0
3,207	0	0	3,237	0	0
3,208	0	0	3,238	0	0
3,209	0	0	3,239	0	0
3,210	0	0	3,240	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,241	0	0	3,271	0	0
3,242	0	0	3,272	0	0
3,243	0	0	3,273	0	0
3,244	0	0	3,274	0	0
3,245	0	0	3,275	0	0
3,246	0	0	3,276	0	0
3,247	0	0	3,277	0	0
3,248	0	0	3,278	0	0
3,249	0	0	3,279	0	0
3,250	0	0	3,280	0	0
3,251	0	0	3,281	0	0
3,252	0	0	3,282	0	13
3,253	0	0	3,283	7	19
3,254	0	0	3,284	19	25
3,255	0	0	3,285	31	29
3,256	0	0	3,286	39	29
3,257	0	0	3,287	39	26
3,258	0	0	3,288	35	23
3,259	0	0	3,289	28	21
3,260	0	0	3,290	20	19
3,261	0	0	3,291	15	17
3,262	0	0	3,292	16	16
3,263	0	0	3,293	24	19
3,264	0	0	3,294	33	21
3,265	0	0	3,295	36	18
3,266	0	0	3,296	32	16
3,267	0	0	3,297	30	20
3,268	0	0	3,298	35	31
3,269	0	0	3,299	43	38
3,270	0	0	3,300	45	36

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,301	37	26	3,331	0	0
3,302	23	17	3,332	0	0
3,303	18	18	3,333	0	0
3,304	27	26	3,334	0	0
3,305	41	31	3,335	0	0
3,306	46	30	3,336	0	0
3,307	35	24	3,337	0	0
3,308	19	19	3,338	0	0
3,309	16	17	3,339	0	0
3,310	26	18	3,340	0	0
3,311	32	16	3,341	0	0
3,312	25	11	3,342	0	0
3,313	12	7	3,343	0	0
3,314	3	8	3,344	0	0
3,315	0	0	3,345	0	0
3,316	0	0	3,346	0	0
3,317	0	0	3,347	0	0
3,318	0	0	3,348	0	0
3,319	0	0	3,349	0	0
3,320	0	0	3,350	0	0
3,321	0	0	3,351	0	0
3,322	0	0	3,352	0	0
3,323	0	0	3,353	0	0
3,324	0	0	3,354	0	0
3,325	0	0	3,355	0	0
3,326	0	0	3,356	0	0
3,327	0	0	3,357	0	0
3,328	0	0	3,358	0	0
3,329	0	0	3,359	0	0
3,330	0	0	3,360	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,361	0	0	3,391	0	0
3,362	0	0	3,392	0	0
3,363	0	0	3,393	0	0
3,364	0	0	3,394	0	0
3,365	0	0	3,395	0	0
3,366	0	0	3,396	0	0
3,367	0	0	3,397	0	0
3,368	0	0	3,398	0	0
3,369	0	0	3,399	0	0
3,370	0	0	3,400	0	0
3,371	0	0	3,401	0	0
3,372	0	0	3,402	0	0
3,373	0	0	3,403	0	0
3,374	0	0	3,404	0	0
3,375	0	0	3,405	0	0
3,376	0	0	3,406	0	0
3,377	0	0	3,407	0	0
3,378	0	0	3,408	0	0
3,379	0	0	3,409	0	0
3,380	0	0	3,410	0	0
3,381	0	0	3,411	0	0
3,382	0	0	3,412	0	0
3,383	0	0	3,413	0	0
3,384	0	0	3,414	0	0
3,385	0	0	3,415	0	0
3,386	0	0	3,416	0	0
3,387	0	0	3,417	0	0
3,388	0	0	3,418	0	0
3,389	0	0	3,419	0	0
3,390	0	0	3,420	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,421	0	0	3,451	50	31
3,422	0	0	3,452	57	34
3,423	0	0	3,453	62	34
3,424	0	0	3,454	63	32
3,425	0	0	3,455	64	34
3,426	0	0	3,456	67	40
3,427	0	0	3,457	72	46
3,428	0	0	3,458	75	49
3,429	0	0	3,459	77	50
3,430	0	0	3,460	78	49
3,431	0	0	3,461	80	50
3,432	0	0	3,462	83	50
3,433	0	0	3,463	84	50
3,434	0	0	3,464	84	49
3,435	0	0	3,465	83	47
3,436	0	0	3,466	82	47
3,437	4	13	3,467	84	49
3,438	13	21	3,468	87	54
3,439	26	29	3,469	92	58
3,440	37	31	3,470	93	57
3,441	40	26	3,471	90	52
3,442	33	20	3,472	86	48
3,443	21	16	3,473	85	48
3,444	13	17	3,474	85	50
3,445	11	18	3,475	84	51
3,446	15	20	3,476	83	48
3,447	21	23	3,477	82	44
3,448	29	25	3,478	79	41
3,449	36	25	3,479	75	39
3,450	43	27	3,480	69	35

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,481	59	28	3,511	12	20
3,482	49	23	3,512	12	20
3,483	44	25	3,513	12	19
3,484	44	32	3,514	12	17
3,485	45	36	3,515	11	17
3,486	47	35	3,516	10	17
3,487	49	31	3,517	11	17
3,488	49	31	3,518	11	17
3,489	44	34	3,519	12	18
3,490	39	37	3,520	12	18
3,491	33	33	3,521	12	17
3,492	26	24	3,522	12	17
3,493	16	16	3,523	12	17
3,494	8	14	3,524	12	17
3,495	12	19	3,525	12	18
3,496	23	25	3,526	13	18
3,497	29	25	3,527	13	17
3,498	27	22	3,528	11	14
3,499	24	19	3,529	8	12
3,500	22	18	3,530	3	12
3,501	19	16	3,531	0	12
3,502	14	13	3,532	0	0
3,503	11	14	3,533	0	0
3,504	8	17	3,534	0	0
3,505	7	20	3,535	0	0
3,506	7	22	3,536	0	0
3,507	8	22	3,537	0	0
3,508	8	21	3,538	0	0
3,509	10	20	3,539	0	0
3,510	12	19	3,540	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,541	0	0	3,571	6	13
3,542	0	0	3,572	7	11
3,543	0	0	3,573	10	10
3,544	0	0	3,574	12	9
3,545	0	0	3,575	13	9
3,546	0	0	3,576	12	8
3,547	0	0	3,577	12	8
3,548	0	0	3,578	12	8
3,549	0	0	3,579	13	8
3,550	0	0	3,580	15	7
3,551	0	0	3,581	15	6
3,552	0	0	3,582	15	6
3,553	0	0	3,583	15	5
3,554	0	0	3,584	14	6
3,555	0	0	3,585	14	7
3,556	0	0	3,586	14	8
3,557	0	0	3,587	14	8
3,558	0	0	3,588	14	7
3,559	0	0	3,589	13	7
3,560	0	0	3,590	13	7
3,561	0	0	3,591	13	7
3,562	0	0	3,592	14	8
3,563	0	0	3,593	14	8
3,564	0	0	3,594	14	8
3,565	0	0	3,595	13	8
3,566	0	0	3,596	13	8
3,567	0	0	3,597	14	7
3,568	0	0	3,598	16	7
3,569	0	17	3,599	17	7
3,570	4	16	3,600	18	7

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,601	19	7	3,631	20	7
3,602	19	7	3,632	20	7
3,603	20	7	3,633	19	7
3,604	20	7	3,634	17	7
3,605	20	7	3,635	16	7
3,606	21	8	3,636	16	8
3,607	21	11	3,637	18	7
3,608	21	14	3,638	18	6
3,609	23	16	3,639	17	6
3,610	25	17	3,640	15	7
3,611	27	15	3,641	14	8
3,612	28	12	3,642	12	8
3,613	26	10	3,643	11	9
3,614	23	9	3,644	10	11
3,615	20	11	3,645	10	12
3,616	20	12	3,646	11	12
3,617	20	11	3,647	12	11
3,618	20	9	3,648	12	9
3,619	18	9	3,649	11	9
3,620	17	10	3,650	8	9
3,621	18	10	3,651	5	10
3,622	19	9	3,652	0	0
3,623	20	7	3,653	0	0
3,624	19	7	3,654	0	0
3,625	20	8	3,655	0	0
3,626	23	9	3,656	0	0
3,627	25	9	3,657	0	0
3,628	25	8	3,658	0	0
3,629	23	7	3,659	0	0
3,630	21	7	3,660	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,661	0	0	3,691	33	8
3,662	0	0	3,692	31	10
3,663	0	18	3,693	31	13
3,664	0	23	3,694	32	14
3,665	5	23	3,695	32	13
3,666	15	22	3,696	32	11
3,667	25	18	3,697	32	11
3,668	30	11	3,698	31	12
3,669	31	6	3,699	30	11
3,670	30	9	3,700	27	11
3,671	32	15	3,701	26	11
3,672	37	16	3,702	26	10
3,673	41	11	3,703	27	9
3,674	40	6	3,704	26	8
3,675	36	7	3,705	25	7
3,676	34	9	3,706	25	7
3,677	34	10	3,707	25	6
3,678	34	8	3,708	26	6
3,679	34	8	3,709	25	6
3,680	33	7	3,710	25	6
3,681	31	7	3,711	25	6
3,682	30	6	3,712	26	7
3,683	29	8	3,713	28	9
3,684	30	11	3,714	29	10
3,685	31	13	3,715	30	10
3,686	32	12	3,716	30	10
3,687	33	10	3,717	28	11
3,688	35	8	3,718	27	12
3,689	36	7	3,719	27	13
3,690	35	6	3,720	29	14

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,721	30	13	3,751	31	22
3,722	30	10	3,752	27	24
3,723	30	7	3,753	24	23
3,724	31	5	3,754	20	17
3,725	33	4	3,755	14	9
3,726	36	4	3,756	7	4
3,727	39	6	3,757	3	4
3,728	40	6	3,758	0	0
3,729	40	7	3,759	0	0
3,730	38	9	3,760	0	0
3,731	34	14	3,761	0	0
3,732	29	21	3,762	0	0
3,733	29	25	3,763	0	0
3,734	30	27	3,764	0	0
3,735	30	26	3,765	0	0
3,736	28	23	3,766	0	0
3,737	26	21	3,767	0	0
3,738	26	22	3,768	0	0
3,739	29	24	3,769	0	0
3,740	34	23	3,770	0	0
3,741	37	18	3,771	0	0
3,742	36	14	3,772	0	0
3,743	33	13	3,773	0	0
3,744	31	15	3,774	0	0
3,745	31	18	3,775	0	0
3,746	32	21	3,776	0	0
3,747	35	22	3,777	0	0
3,748	38	21	3,778	0	0
3,749	38	19	3,779	4	9
3,750	35	19	3,780	4	13

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,781	4	18	3,811	30	25
3,782	0	22	3,812	29	28
3,783	0	24	3,813	30	27
3,784	0	27	3,814	31	24
3,785	9	33	3,815	32	20
3,786	19	36	3,816	33	19
3,787	28	34	3,817	31	21
3,788	30	31	3,818	29	24
3,789	27	30	3,819	28	27
3,790	24	29	3,820	31	26
3,791	25	26	3,821	36	24
3,792	29	20	3,822	37	24
3,793	32	13	3,823	37	24
3,794	32	11	3,824	37	22
3,795	31	15	3,825	39	16
3,796	31	22	3,826	41	13
3,797	32	26	3,827	44	13
3,798	32	26	3,828	46	14
3,799	30	27	3,829	48	14
3,800	27	32	3,830	46	14
3,801	25	35	3,831	40	14
3,802	25	32	3,832	30	13
3,803	27	24	3,833	20	11
3,804	29	18	3,834	12	9
3,805	30	17	3,835	5	10
3,806	32	20	3,836	0	15
3,807	33	22	3,837	0	19
3,808	36	21	3,838	0	23
3,809	36	19	3,839	0	26
3,810	33	21	3,840	0	27

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,841	0	27	3,871	19	24
3,842	0	28	3,872	20	22
3,843	0	28	3,873	20	23
3,844	0	28	3,874	20	24
3,845	6	29	3,875	20	24
3,846	11	32	3,876	20	24
3,847	15	35	3,877	22	24
3,848	19	35	3,878	24	24
3,849	26	28	3,879	26	22
3,850	33	18	3,880	25	22
3,851	36	12	3,881	24	23
3,852	34	12	3,882	24	25
3,853	31	14	3,883	26	24
3,854	26	18	3,884	25	22
3,855	22	20	3,885	22	23
3,856	18	21	3,886	21	27
3,857	17	21	3,887	22	28
3,858	17	19	3,888	25	27
3,859	16	18	3,889	28	25
3,860	14	18	3,890	33	21
3,861	12	20	3,891	34	14
3,862	12	21	3,892	26	7
3,863	15	20	3,893	12	6
3,864	17	19	3,894	0	13
3,865	16	19	3,895	0	19
3,866	13	21	3,896	0	23
3,867	10	25	3,897	0	25
3,868	10	27	3,898	0	26
3,869	13	28	3,899	0	27
3,870	16	26	3,900	0	28

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,901	0	29	3,931	0	30
3,902	0	29	3,932	0	30
3,903	0	29	3,933	0	30
3,904	0	29	3,934	0	30
3,905	0	29	3,935	0	30
3,906	0	30	3,936	0	30
3,907	0	32	3,937	0	30
3,908	0	39	3,938	0	28
3,909	0	50	3,939	3	25
3,910	0	52	3,940	4	22
3,911	0	39	3,941	7	21
3,912	0	25	3,942	11	17
3,913	0	23	3,943	13	14
3,914	0	26	3,944	13	12
3,915	0	28	3,945	12	13
3,916	0	29	3,946	14	15
3,917	0	29	3,947	14	15
3,918	0	30	3,948	11	17
3,919	0	30	3,949	7	20
3,920	0	30	3,950	6	23
3,921	0	30	3,951	8	24
3,922	0	30	3,952	10	22
3,923	0	30	3,953	11	19
3,924	0	30	3,954	10	20
3,925	0	30	3,955	11	21
3,926	0	30	3,956	16	20
3,927	0	30	3,957	24	18
3,928	0	30	3,958	31	16
3,929	0	30	3,959	35	13
3,930	0	30	3,960	36	11

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
3,961	36	12	3,991	12	17
3,962	35	12	3,992	9	17
3,963	33	12	3,993	8	17
3,964	30	13	3,994	8	16
3,965	29	15	3,995	7	15
3,966	29	16	3,996	6	16
3,967	30	17	3,997	7	20
3,968	30	17	3,998	11	23
3,969	30	17	3,999	12	22
3,970	31	16	4,000	11	21
3,971	30	16	4,001	8	22
3,972	30	16	4,002	9	25
3,973	32	16	4,003	14	26
3,974	35	15	4,004	22	23
3,975	36	15	4,005	27	18
3,976	35	15	4,006	29	14
3,977	31	17	4,007	29	12
3,978	30	18	4,008	30	12
3,979	31	17	4,009	29	14
3,980	28	17	4,010	26	18
3,981	21	18	4,011	23	20
3,982	13	19	4,012	21	22
3,983	8	21	4,013	19	23
3,984	5	23	4,014	19	23
3,985	3	25	4,015	20	23
3,986	0	26	4,016	19	22
3,987	4	24	4,017	17	23
3,988	8	23	4,018	16	25
3,989	13	22	4,019	16	27
3,990	14	20	4,020	17	26

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
4,021	16	24	4,051	29	33
4,022	11	24	4,052	41	26
4,023	5	27	4,053	47	20
4,024	0	30	4,054	47	20
4,025	0	30	4,055	43	22
4,026	0	30	4,056	40	23
4,027	0	30	4,057	38	21
4,028	0	30	4,058	35	19
4,029	0	30	4,059	35	18
4,030	0	30	4,060	37	17
4,031	0	30	4,061	39	14
4,032	0	30	4,062	38	12
4,033	0	30	4,063	34	12
4,034	0	30	4,064	30	13
4,035	0	30	4,065	24	12
4,036	0	30	4,066	18	13
4,037	0	30	4,067	11	19
4,038	0	30	4,068	5	25
4,039	0	30	4,069	0	28
4,040	0	29	4,070	0	29
4,041	4	30	4,071	0	29
4,042	6	30	4,072	0	30
4,043	6	30	4,073	0	31
4,044	7	27	4,074	0	31
4,045	10	25	4,075	0	34
4,046	16	24	4,076	0	40
4,047	20	24	4,077	4	42
4,048	21	27	4,078	10	37
4,049	19	33	4,079	22	28
4,050	20	37	4,080	31	20

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
4,081	35	16	4,111	42	4
4,082	38	13	4,112	40	5
4,083	39	10	4,113	38	5
4,084	38	9	4,114	37	5
4,085	35	10	4,115	36	4
4,086	33	12	4,116	33	5
4,087	32	17	4,117	32	6
4,088	32	20	4,118	31	7
4,089	33	22	4,119	32	8
4,090	35	22	4,120	33	8
4,091	39	20	4,121	34	8
4,092	42	16	4,122	36	8
4,093	42	13	4,123	37	6
4,094	39	13	4,124	39	3
4,095	35	16	4,125	40	2
4,096	32	18	4,126	43	2
4,097	31	19	4,127	48	3
4,098	31	18	4,128	53	4
4,099	32	18	4,129	55	4
4,100	33	17	4,130	54	4
4,101	36	17	4,131	51	5
4,102	41	16	4,132	46	8
4,103	44	14	4,133	41	13
4,104	46	12	4,134	38	19
4,105	46	9	4,135	38	23
4,106	46	7	4,136	39	24
4,107	46	6	4,137	41	21
4,108	45	5	4,138	40	18
4,109	44	3	4,139	36	17
4,110	43	3	4,140	36	18

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
4,141	40	17	4,171	46	7
4,142	46	16	4,172	46	7
4,143	51	15	4,173	46	7
4,144	54	15	4,174	46	6
4,145	53	16	4,175	45	5
4,146	51	18	4,176	45	6
4,147	48	19	4,177	45	6
4,148	46	20	4,178	46	7
4,149	44	18	4,179	46	7
4,150	43	15	4,180	46	7
4,151	39	12	4,181	45	9
4,152	35	12	4,182	46	9
4,153	34	15	4,183	46	8
4,154	37	16	4,184	44	7
4,155	39	12	4,185	43	7
4,156	40	10	4,186	43	7
4,157	42	11	4,187	46	8
4,158	44	10	4,188	50	9
4,159	44	9	4,189	54	10
4,160	43	9	4,190	57	9
4,161	42	10	4,191	55	7
4,162	41	11	4,192	51	8
4,163	42	12	4,193	50	10
4,164	43	12	4,194	51	12
4,165	45	11	4,195	52	11
4,166	47	9	4,196	52	10
4,167	48	7	4,197	53	10
4,168	47	6	4,198	54	8
4,169	47	6	4,199	55	8
4,170	46	7	4,200	58	10

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
4,201	61	12	4,231	42	10
4,202	61	11	4,232	44	7
4,203	57	9	4,233	44	6
4,204	52	9	4,234	45	6
4,205	49	10	4,235	45	5
4,206	46	9	4,236	44	5
4,207	45	7	4,237	41	5
4,208	44	7	4,238	35	3
4,209	45	8	4,239	25	2
4,210	45	7	4,240	14	1
4,211	42	6	4,241	6	2
4,212	37	7	4,242	0	0
4,213	33	13	4,243	0	0
4,214	33	19	4,244	0	0
4,215	40	22	4,245	0	0
4,216	49	22	4,246	0	0
4,217	54	15	4,247	0	0
4,218	53	8	4,248	0	0
4,219	50	5	4,249	0	0
4,220	51	7	4,250	0	0
4,221	53	7	4,251	7	7
4,222	52	5	4,252	14	10
4,223	46	3	4,253	17	15
4,224	42	3	4,254	17	18
4,225	43	3	4,255	20	17
4,226	45	2	4,256	26	12
4,227	42	2	4,257	30	10
4,228	37	6	4,258	32	9
4,229	35	11	4,259	32	8
4,230	38	13	4,260	31	7

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
4,261	28	6	4,291	0	0
4,262	25	8	4,292	0	0
4,263	25	11	4,293	0	0
4,264	25	13	4,294	0	0
4,265	24	14	4,295	0	0
4,266	22	16	4,296	0	0
4,267	18	17	4,297	0	0
4,268	13	13	4,298	0	0
4,269	8	7	4,299	0	0
4,270	4	4	4,300	0	0
4,271	0	0	4,301	0	0
4,272	0	0	4,302	0	0
4,273	0	0	4,303	0	0
4,274	0	0	4,304	0	0
4,275	0	0	4,305	0	0
4,276	0	0	4,306	0	0
4,277	0	0	4,307	0	0
4,278	0	0	4,308	0	0
4,279	0	0	4,309	0	0
4,280	0	0	4,310	0	0
4,281	0	0	4,311	0	0
4,282	0	0	4,312	0	0
4,283	0	0	4,313	0	0
4,284	0	0	4,314	0	0
4,285	0	0	4,315	0	0
4,286	0	0	4,316	0	0
4,287	0	0	4,317	0	0
4,288	0	0	4,318	0	0
4,289	0	0	4,319	0	0
4,290	0	0	4,320	0	0

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
4,321	0	0	4,351	71	15
4,322	0	0	4,352	72	19
4,323	0	0	4,353	73	20
4,324	0	0	4,354	73	21
4,325	0	0	4,355	72	27
4,326	0	0	4,356	72	36
4,327	0	0	4,357	72	41
4,328	0	0	4,358	72	39
4,329	0	0	4,359	72	34
4,330	0	0	4,360	72	32
4,331	0	0	4,361	72	36
4,332	0	0	4,362	72	42
4,333	0	0	4,363	73	45
4,334	0	0	4,364	72	45
4,335	0	0	4,365	72	47
4,336	0	0	4,366	71	50
4,337	0	0	4,367	71	52
4,338	0	0	4,368	71	51
4,339	5	7	4,369	72	47
4,340	24	8	4,370	72	40
4,341	49	13	4,371	71	32
4,342	67	23	4,372	70	26
4,343	72	31	4,373	68	25
4,344	71	31	4,374	68	26
4,345	69	25	4,375	68	29
4,346	67	20	4,376	68	41
4,347	67	19	4,377	69	64
4,348	68	17	4,378	71	85
4,349	70	14	4,379	73	93
4,350	71	13	4,380	73	87

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
4,381	72	75	4,411	0	0
4,382	71	64	4,412	0	0
4,383	70	57	4,413	0	0
4,384	70	56	4,414	0	0
4,385	70	61	4,415	0	0
4,386	70	67	4,416	0	0
4,387	70	60	4,417	0	0
4,388	72	41	4,418	0	0
4,389	72	28	4,419	0	0
4,390	72	25	4,420	0	0
4,391	71	26	4,421	0	0
4,392	70	25	4,422	0	0
4,393	70	24	4,423	0	0
4,394	69	21	4,424	0	0
4,395	69	17	4,425	0	0
4,396	69	14	4,426	0	0
4,397	70	12	4,427	0	0
4,398	72	10	4,428	0	14
4,399	72	9	4,429	8	28
4,400	73	8	4,430	24	45
4,401	71	7	4,431	47	57
4,402	62	4	4,432	66	59
4,403	41	2	4,433	73	50
4,404	18	3	4,434	72	43
4,405	3	7	4,435	71	50
4,406	0	0	4,436	71	67
4,407	0	0	4,437	72	77
4,408	0	0	4,438	72	78
4,409	0	0	4,439	72	75
4,410	0	0	4,440	72	70

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
4,441	71	62	4,471	72	54
4,442	70	50	4,472	72	59
4,443	69	35	4,473	72	70
4,444	69	22	4,474	72	81
4,445	70	15	4,475	71	87
4,446	72	16	4,476	71	84
4,447	73	26	4,477	71	77
4,448	72	42	4,478	71	71
4,449	72	55	4,479	71	72
4,450	73	54	4,480	71	76
4,451	74	40	4,481	72	75
4,452	73	29	4,482	73	70
4,453	72	38	4,483	73	65
4,454	72	59	4,484	73	63
4,455	72	69	4,485	73	61
4,456	74	57	4,486	72	59
4,457	74	39	4,487	72	59
4,458	72	34	4,488	72	60
4,459	68	38	4,489	73	63
4,460	67	42	4,490	72	68
4,461	67	48	4,491	70	70
4,462	68	53	4,492	70	63
4,463	70	53	4,493	71	52
4,464	72	52	4,494	71	48
4,465	72	60	4,495	72	49
4,466	72	68	4,496	72	53
4,467	71	70	4,497	71	58
4,468	72	66	4,498	72	59
4,469	72	61	4,499	72	53
4,470	73	55	4,500	73	47

Time	Normalized Speed	Normalized Torque	Time	Normalized Speed	Normalized Torque
(sec.)	(%)	(%)	(sec.)	(%)	(%)
4,501	72	49	4,531	71	12
4,502	72	57	4,532	72	10
4,503	73	65	4,533	70	9
4,504	73	65	4,534	61	5
4,505	73	59	4,535	40	2
4,506	72	51	4,536	18	7
4,507	71	47	4,537	12	3
4,508	71	45	4,538	8	0
4,509	71	46	4,539	5	0
4,510	72	50	4,540	0	0
4,511	72	55	4,541	0	0
4,512	72	59	4,542	0	0
4,513	72	60	4,543	0	0
4,514	71	58	4,544	0	0
4,515	71	54	4,545	0	0
4,516	71	52	4,546	0	0
4,517	72	52	4,547	0	0
4,518	72	47	4,548	0	0
4,519	73	37	4,549	0	0
4,520	74	26	4,550	0	0
4,521	74	23	4,551	0	0
4,522	72	32	4,552	0	0
4,523	71	48	4,553	0	0
4,524	72	57	4,554	0	0
4,525	72	51	4,555	0	0
4,526	72	40	4,556	0	0
4,527	73	37	4,557	0	0
4,528	72	39	4,558	0	0
4,529	72	35	4,559	0	0
4,530	71	23	4,560	0	0

Time (sec.)	Normalized Speed (%)	Normalized Torque (%)	Time (sec.)	Normalized Speed (%)	Normalized Torque (%)
4,561	0	0	4,566	0	0
4,562	0	0	4,567	0	0
4,563	0	0	4,568	0	0
4,564	0	0	4,569	0	0
4,565	0	0	4,570	0	0

Subpart C – Idle Test.

1. **How do I run an idle emission test?**

The engine manufacturer shall measure emissions using the procedures described in this section to determine whether engines meet the idle emission standards in title 13, CCR, section 2423.1, subsection (d)(3).

1.1 The engine manufacturer shall perform the idle tests as follows:

1.1.1 The engine manufacturer shall warm up the engine by operating it over the NRTC or the applicable steady-state duty cycle, or by operating it at any speed above peak-torque speed and at 65 to 85 percent of maximum mapped power. The warm-up is complete when the engine thermostat controls engine temperature or when the engine coolant's temperature is within 2 percent of its mean value for at least 2 minutes.

1.1.2 The engine manufacturer shall start operating the engine with a speed setpoint at its recommended warm idle speed. The engine manufacturer shall set a power demand corresponding to 3.5 percent of the emission-data engine's declared maximum power for the engine family to account for accessory loads.

1.1.3 The engine manufacturer shall start sampling emissions 10 minutes after reaching the speed and torque setpoints and continue emission sampling and engine operation at those setpoints. The engine manufacturer shall stop emission sampling after 1200 seconds to complete the test interval.

1.2 The engine manufacturer shall verify that the test speed stays within ± 50 rpm of the speed setpoint throughout the test. The torque tolerance is ± 2 percent of the maximum mapped torque at the test speed. The engine manufacturers shall verify that measured torque meets the torque tolerance relative to the torque setpoint throughout the test.

1.3 The engine manufacturer shall calculate the mean mass emission rate of NO_X over test interval by calculating the total emission mass and dividing it by the total emissions sampling time.

2. **What are the requirements for automatic engine shutdown systems?**

This section specifies requirements that apply for the idle-reduction requirement compliance option specified in title 13, CCR, section 2423.1, subsection (d)(3)(B)2.b.

2.1 ***Automatic engine shutdown (AES) system***. The AES system shall shut down the engine within a threshold idling period of 300 seconds or less when all of the following conditions are met:

2.1.1 The engine speed is at the manufacturer-declared idle speed as defined in section 1065.1001, and

2.1.2 The engine load is at or below 3.5 percent of the emission-data engine's declared maximum power for the engine family.

2.2 ***Automatic override conditions.*** The AES system may be overridden automatically while any of the conditions in subsections 2.2.1, 2.2.2, or 2.2.3 apply. At the end of the override, the engine's electronic control module shall restart the timer for the idling period. We may approve additional override criteria as needed to protect the engine and equipment from damage and to ensure safe equipment operation.

2.2.1 The engine coolant temperature is below 60 ˚F (15.6 ˚C).

2.2.2 The exhaust emission control device is regenerating.

2.2.3 Idling is necessary for engine protection.

2.2.4 The equipment's main battery state-of-charge is not sufficient to allow the engine to be restarted.

2.3 ***Manual override conditions.*** The AES system may be overridden manually for any of the following idling operations:

2.3.1 idling when queuing

2.3.2 idling to verify that the vehicle is in safe operating condition

2.3.3 idling for testing, servicing, repairing or diagnostic purposes

2.3.4 idling necessary to accomplish work for which the vehicle was designed (such as operating a crane)

2.3.5 idling required to bring the machine system to operating temperature

2.3.6 idling necessary to ensure safe operation of the vehicle

2.3.7 idling necessary to control the cabin temperature when the ambient temperature is below 68 ˚F (20 ˚C) or above 76 ˚F (24.4 ˚C).

2.4 ***Manual override methods.*** The AES system may temporarily be overridden by a designated button for up to one hour for idling operations specified in section 2.3, above. At the end of the set deactivation period, the engine's electronic control module shall restart the engine shutdown system sequence.

Part VII: 40 CFR PART 1042 – CONTROL OF EMISSIONS FROM NEW AND IN-USE MARINE COMPRESSION-IGNITION ENGINES AND VESSELS

Subpart A – Overview and Applicability

§ 1042.1 Applicability. June 29, 2021.

[No change, except that the requirements of 40 CFR Part 1042 shall only apply to marine compression-ignition engines below 37 kW certified for sale in California under title 13, CCR, section 2423, subsection (b)(1)(C) and section 2423.2, and vessels containing such engines.]

§ 1042.2 Who is responsible for compliance? October 25, 2016. [No change.]

§ 1042.5 Exclusions. April 30, 2010. [No change.]

§ 1042.10 Organization of this part. June 30, 2008. [No change.]

§ 1042.15 Do any other regulation parts apply to me? April 30, 2010. [No change.]

§ 1042.30 Submission of information. October 25, 2016. [No change.]

Subpart B – Emission Standards and Related Requirements

§ 1042.101 Exhaust emission standards for Category 1 and Category 2 engines. June 29, 2021.

[No change, except that only the requirements applicable to Category 1 marine compression-ignition engines below 37 kW shall apply.]

§ 1042.104 Exhaust emission standards for Category 3 engines. June 29, 2021. [n/a]

§ 1042.107 Evaporative emission standards. October 8, 2008. [n/a]

§ 1042.110 Recording reductant use and other diagnostic functions. January 24, 2023. [No change.]

§ 1042.115 Other requirements. January 24, 2023. [No change.]

§ 1042.120 Emission-related warranty requirements. October 25, 2016. [No change, except that the reference to “40 CFR part 1068, Appendix I” shall mean “Part V: 40 CFR PART 1068, Appendix A to Part 1068”.]

§ 1042.125 Maintenance instructions. June 29, 2021. [No change.]

§ 1042.130 Installation instructions for vessel manufacturers. October 25, 2016. [No change.]

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

§ 1042.135 Labeling. June 29, 2021.

1. Subparagraphs (a) and (b): [No change.]

2. Subparagraph (c): Amend as follows:

2.1 Subparagraphs (1) through (5): [No change.]

2.2 Delete subparagraph (6). Replace with the following: Identify the application(s) for which the engine family is certified (such as constant-speed auxiliary, variable-speed propulsion engines used with fixed-pitch propellers, etc.). If the engine is certified as a recreational engine, state: “INSTALLING THIS RECREATIONAL ENGINE IN A COMMERCIAL VESSEL OR USING THE VESSEL FOR COMMERCIAL PURPOSES MAY VIOLATE CALIFORNIA LAW SUBJECT TO CIVIL PENALTY.”

2.3 Subparagraphs (7) through (9): [No change.]

2.4 Delete subparagraph (10). Replace with the following: State: “THIS MARINE ENGINE COMPLIES WITH CALIFORNIA REGULATIONS FOR [MODEL YEAR].”

2.5 Delete subparagraph (11). Replace with the following: For a Category 1 engine that can be modified to operate on residual fuel, but has not been certified to meet the standards on such a fuel, include the statement: “THIS ENGINE IS CERTIFIED FOR OPERATION ONLY WITH DIESEL FUEL. MODIFYING THE ENGINE TO OPERATE ON RESIDUAL OR INTERMEDIATE FUEL MAY BE A VIOLATION OF CALIFORNIA LAW SUBJECT TO CIVIL PENALTIES.”

2.6 Delete subparagraph (12). Replace with the following: For an engine equipped with on-off emission controls as allowed by Part VII: 40 CFR PART 1042, Subpart B, section 1042.115, include the statement: “THIS ENGINE IS CERTIFIED WITH ON-OFF EMISSION CONTROLS. OPERATION OF THE ENGINE CONTRARY TO 40 CFR 1042.115(g) IS A VIOLATION OF CALIFORNIA LAW SUBJECT TO CIVIL PENALTIES.”

2.7 Subparagraph (13): [No change.]

3. Subparagraphs (d) through (g): [No change.]

§ 1042.140 Maximum engine power, displacement, power density, and maximum in-use engine speed. October 25, 2016. [No change.]

§ 1042.145 Interim provisions. January 24, 2023. [n/a]

Subpart C – Certifying Engine Families

§ 1042.201 General requirements for obtaining a certificate of conformity. October 25, 2016. [No change.]

§ 1042.205 Application requirements. January 24, 2023.

1. Introductory paragraph: [No change.]

2. Subparagraphs (a) through (v): [No change.]

3. Delete subparagraph (w). Replace with the following: Unconditionally certify that all the engines in the engine family comply with the requirements of this part, other referenced parts of the California Code of Regulations, and the California Health and Safety Code.

4. Subparagraph (x): [No change, except "U.S.-directed" shall mean "U.S.-directed and CA-directed."]

5. Subparagraphs (y) through (bb): [No change.]

§ 1042.210 Preliminary approval. June 30, 2008. [No change.]

§ 1042.220 Amending maintenance instructions. April 30, 2010. [No change.]

§ 1042.225 Amending applications for certification. October 25, 2016. [No change.]

§ 1042.230 Engine families. April 30, 2010. [No change.]

§ 1042.235 Emission testing related to certification. June 29, 2021. [No change, except that the reference to "the emission standards in § 1042.101(a) or § 1042.104" shall mean "the emission standards in title 13, CCR, section 2423.2."]

§ 1042.240 Demonstrating compliance with exhaust emission standards. October 25, 2016. [No change.]

§ 1042.245 Deterioration factors. January 24, 2023. [No change.]

§ 1042.250 Recordkeeping and reporting. October 25, 2016.

[No change, except "U.S.-directed" shall mean "U.S.-directed and CA-directed."]

§ 1042.255 EPA decisions. June 29, 2021.

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

2. Delete subparagraph (b). Replace with the following: CARB may deny the engine manufacturer's application for certification if CARB determines that an

engine manufacturer's engine family fails to comply with emission standards or other requirements of this part or the California Health and Safety Code, Division 26, and corresponding regulations. CARB's decision shall be based on all available information. If CARB denies an engine manufacturer's application for certification, CARB shall explain why in writing.

3. Subparagraph (c): [No change.]

4. Delete subparagraph (d). Replace with the following: A violation of the requirements of this section is a violation of the applicable provisions of the California Health and Safety Code, Division 26, and corresponding regulations, and is subject to the penalty provisions thereunder.

5. Subparagraphs (e) and (f): [No change.]

Subpart D – Testing Production-line Engines

§ 1042.301 General provisions. January 24, 2023. [No change.]

§ 1042.302 Applicability of this subpart for Category 3 engines. January 24, 2023. [n/a]

§ 1042.305 Preparing and testing production-line engines. January 24, 2023. [No change.]

§ 1042.310 Engine selection for Category 1 and Category 2 engines. January 24, 2023. [No change.]

§ 1042.315 Determining compliance. January 24, 2023. [No change.]

§ 1042.320 What happens if one of my production-line engines fails to meet emission standards? January 24, 2023. [No change.]

§ 1042.325 What happens if an engine family fails the production-line testing requirements? January 24, 2023. [No change.]

§ 1042.330 Selling engines from an engine family with a suspended certificate of conformity. June 30, 2008. [No change.]

§ 1042.335 Reinstating suspended certificates. June 30, 2008. [No change.]

§ 1042.340 When may EPA revoke my certificate under this subpart and how may I sell these engines again? June 30, 2008. [No change.]

§ 1042.345 Reporting. January 24, 2023.

1. Subparagraphs (a) through (c): [No change.]

2. Delete subparagraph (d). Replace with the following: An authorized representative of your company shall sign the following statement:

We submit this report under the California Health and Safety Code and its corresponding regulations. Our production-line testing conformed completely with the requirements of 40 CFR part 1042. We have not changed production processes or quality-control procedures for test engines in a way that might affect emission controls. All the information in this report is true and accurate to the best of my knowledge after conducting due diligence. I am aware of the penalties for violating the California Health and Safety Code and the regulations. (Authorized Company Representative)

3. Subparagraph (e): [No change.]

4. Delete subparagraph (f). Replace with the following: Disclosure of reports shall be handled in accordance with title 13, CCR, section 2423.2, subsection (g).

§ 1042.350 Recordkeeping. April 30, 2010. [No change.]

Subpart E – In-Use Testing

§ 1042.401 General Provisions. June 30, 2008. [No change.]

Subpart F – Test Procedures

§ 1042.501 How do I run a valid emission test? October 25, 2016. [No change.]

§ 1042.505 Testing engines using discrete-mode or ramped-modal duty cycles. October 2, 2020. [No change.]

§ 1042.515 Test procedures related to not-to-exceed standards. January 24, 2023. [No change.]

§ 1042.520 What testing must I perform to establish deterioration factors? June 30, 2008. [No change.]

§ 1042.525 How do I adjust emission levels to account for infrequently regenerating aftertreatment devices? October 25, 2016. [No change.]

Subpart G – Special Compliance Provisions

§ 1042.601 General compliance provisions for marine engines and vessels. October 25, 2016. [No change.]

§ 1042.605 Dressing engines already certified to other standards for nonroad or heavy-duty highway engines for marine use. June 29, 2021.

1. Delete subparagraph (a). Replace with the following: ***General provisions***. If you are an engine manufacturer (including someone who marinizes a land-based engine), this section allows you to introduce new marine engines into California commerce if they are already certified to the requirements that apply to

compression-ignition engines under title 13, CCR, section 1956.8 or to the exhaust emission standards in title 13, CCR, section 2423 or title 13, CCR, section 2423.1 for the appropriate model year. If an engine manufacturer complies with all the provisions of this section, CARB shall consider the Executive Order issued for each engine that is certified under title 13, CCR, section 1956.8 or that is certified to the exhaust emission standards in title 13, CCR, section 2423 or title 13, CCR, section 2423.1 to also be a valid Executive Order under this part for its model year, without a separate application for certification under the requirements of this part. This section shall not apply for Category 3 engines.

2. Delete subparagraph (b). Replace with the following: ***Vessel-manufacturer provisions***. If you are not an engine manufacturer, you may install an engine certified for the appropriate model year under title 13, CCR, section 1956.8 or to the exhaust emission standards in title 13, CCR, section 2423 or title 13, CCR, section 2423.1 in a marine vessel as long as you do not make any of the changes described in subparagraph (d)(3) of this section and you meet the requirements of subparagraph (e) of this section. If you modify the non-marine engine in any of the ways described in subparagraph (d)(3) of this section, we will consider you a manufacturer of a new marine engine. Such engine modifications prevent you from using the provisions of this section.

3. Delete subparagraph (c). Replace with the following: ***Liability***. Engines for which you meet the requirements of this section are exempt from all the requirements and prohibitions of this part, except for those specified in this section. Engines exempted under this section must meet all the applicable requirements from title 13, CCR, section 1956.8 or to the exhaust emission standards in title 13, CCR, section 2423 or title 13, CCR, section 2423.1, and the incorporated test procedures. This paragraph (c) applies to engine manufacturers, vessel manufacturers that use such an engine, and all other persons as if the engine were used in its originally intended application. The prohibited acts of 40 CFR 1068.101(a)(1) apply to these new engines and vessels; however, CARB considers the Executive Orders issued for each engine that has certified to the exhaust emission standards in title 13, CCR, section 1956.8 or to the exhaust emission standards in title 13, CCR, section 2423 or title 13, CCR, section 2423.1 to also be a valid Executive Order under this part for its model year. If CARB makes a determination that these engines do not conform to the regulations in this chapter during their useful life, CARB may pursue corrective action or other civil penalties under division 26 of California Health and Safety Code.

4. Subparagraph (d): Amend as follows:

4.1 Introductory paragraph: [No change.]

4.2 Subparagraph (1): Amend as follows:

4.2.1 Introductory sentence: [No change.]

4.2.2 Delete subparagraph (i). Replace with the following: Heavy-duty highway engines (title 13, CCR, section 1956.8).

4.2.3 Delete subparagraph (ii). Replace with the following: Land-based compression-ignition nonroad engines (title 13, CCR, section 2423 or title 13, CCR, section 2423.1).

4.2.4 Subparagraph (iii): [n/a]

4.3 Delete subparagraph (2). Replace with the following: The engine must have the label required under title 13, CCR, section 1956.8 and the incorporated test procedures or title 13, CCR, sections 2423 and 2424 and the "2011 and Later Test Procedures" or title 13, CCR, sections 2423.1 and 2424 and Part III: 40 CFR PART 1039 of these test procedures.

4.4 Subparagraph (3): [No change.]

4.5 Subparagraph (4): [No change, except that "sales in the United States" shall mean "sales in California."]

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

6. Delete subparagraph (f). Replace with the following: ***Failure to comply***. If your engines do not meet the criteria listed in paragraph (d) of this section, they will be subject to the standards, requirements, and prohibitions of this part and the Executive Order issued under title 13, CCR, section 1956.8, 2423, or 2423.1 will not be deemed to also be an Executive Order issued under this part. Introducing these engines into California commerce as marine engines without a valid exemption or certificate of conformity under this part violates the prohibitions in 40 CFR 1068.101(a)(1).

7. Subparagraph (g): [No change.]

8. Subparagraph (h). [No change.]

9. Subparagraph (i): [No change.]

§ 1042.610 Certifying auxiliary marine engines to land-based standards. June 29, 2021.

1. Introductory paragraph: [No change.]

2. Delete subparagraph (a). Replace with the following: ***General provisions***. If you are an engine manufacturer, this section allows you to introduce new marine engines into California commerce if they are already certified to the requirements that apply to compression-ignition engines under title 13, CCR, section 2423 or

section 2423.1 for the appropriate model year. If you comply with all the provisions of this section, CARB shall consider the Executive Order issued under title 13, CCR, section 2423 or 2423.1 for each engine to also be a valid Executive Order under title 13, CCR, section 2423.2 for its model year, without a separate application for certification under the requirements of this part.

3. Subparagraphs (b) through (f): [No change.]

4. Delete subparagraph (g). Replace with the following: ***Participation in California averaging, banking, and trading (CA-ABT)***. An engine manufacturer shall not generate or use emission credits under this part if the engines use the exemption in this section. An engine manufacturer may generate credits for these engines under the CA-ABT provisions in Part III: 40 CFR PART 1039, Subpart H, if the engines are certified to the Tier 5 final exhaust emission standards in title 13, CCR, section 2423.1, subsection (d)(1)A). An engine manufacturer shall use emission credits under the CA-ABT provisions in Part III: 40 CFR PART 1039, Subpart H, as applicable, to certify these engines if the engines are certified to an FEL that exceeds a Tier 5 final exhaust emission standard in title 13, CCR, section 2423.1, subsection (d)(1)A).

5. Subparagraph (h): [No change.]

§ 1042.615 Replacement engine exemption. January 24, 2023. [No change, except that the reporting requirements in "IACD-2025-09 (Marine CI)" shall apply.]

§ 1042.620 Engines used solely for competition. April 30, 2010. [No change.]

§ 1042.625 Special provisions for engines used in emergency applications. April 30, 2010.

1. Introductory paragraph: [No change.]

2. Subparagraphs (a) and (b): [No change.]

3. Subparagraph (c): Amend as follows:

3.1 Delete introductory sentence. Replace with the following: If an engine manufacturer introduces an engine into California commerce under this section, the engine manufacturer shall meet the labeling requirements in Part VII: 40 CFR PART 1042, Subpart B, section 1042.135, but the engine manufacturer shall add one of the following statements instead of the compliance statement in Part VII: 40 CFR PART 1042, Subpart B, section 1042.135, subparagraph (c)(10):

3.2 Delete subparagraph (1). Replace with the following: For lifeboats and rescue boats, add the following statement:

THIS ENGINE DOES NOT COMPLY WITH CURRENT CA EMISSION STANDARDS UNDER 40 CFR 1042.625 AND IS FOR USE SOLELY IN LIFEBOATS OR RESCUE BOATS (COAST GUARD APPROVAL SERIES 160.135 OR 160.156). INSTALLATION OR USE OF THIS ENGINE IN ANY OTHER APPLICATION MAY BE A VIOLATION OF CALIFORNIA LAW SUBJECT TO CIVIL PENALTY.

3.3 Delete subparagraph (2). Replace with the following: For engines serving as final emergency power sources, add the following statement:

THIS ENGINE DOES NOT COMPLY WITH CURRENT CA EMISSION STANDARDS UNDER 40 CFR 1042.625 AND IS FOR USE SOLELY IN EMERGENCY EQUIPMENT REGULATED BY 46 CFR 112. INSTALLATION OR USE OF THIS ENGINE IN ANY OTHER APPLICATION MAY BE A VIOLATION OF CALIFORNIA LAW SUBJECT TO CIVIL PENALTY.

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

§ 1042.630 Personal-use exemption. October 25, 2016. [No change.]

§ 1042.635 National security exemption. October 25, 2016. [No change.]

§ 1042.650 Exemptions for migratory vessels and auxiliary engines on Category 3 vessels. June 29, 2021. [n/a]

§ 1042.655 Special certification provisions for Category 3 engines with aftertreatment. June 29, 2021. [n/a]

§ 1042.660 Requirements for vessel manufacturers, owners, and operators. January 24, 2023. [No change.]

§ 1042.670 Special provisions for gas turbine engines. October 25, 2016. [No change.]

Subpart H – Averaging, Banking, and Trading for Certification

Add the following: Engines certified to title 13, CCR, section 2423.2 and Part VII: 40 CFR PART 1042 of these test procedures are not eligible to generate or use CA-ABT credits under Part III: 40 CFR PART 1039, Subpart H.

§ 1042.701 General provisions. June 29, 2021. [No change.]

§ 1042.705 Generating and calculating emission credits. October 25, 2016. [No change.]

§ 1042.710 Averaging emission credits. October 25, 2016. [No change.]

§ 1042.715 Banking emission credits. April 30, 2010. [No change.]

This text is draft, for purposes of discussion, and may be revised and/or reorganized in the future.

§ 1042.720 Trading emission credits. April 30, 2010. [No change.]

§ 1042.725 Information required for the application for certification. October 25, 2016. [No change.]

§ 1042.730 ABT reports. October 25, 2016. [No change.]

§ 1042.735 Recordkeeping. October 25, 2016. [No change.]

§ 1042.745 Noncompliance. June 30, 2008. [No change.]

Subpart I – Special Provisions for Remanufactured Marine Engines

§ 1042.801 General provisions. June 29, 2021. [No change.]

§ 1042.810 Requirements for owner/operators and installers during remanufacture. October 25, 2016. [No change.]

§ 1042.815 Demonstrating availability. June 30, 2008. [No change.]

§ 1042.820 Emission standards and required emission reductions for remanufactured engines. June 30, 2008. [No change.]

§ 1042.825 Baseline determination. June 30, 2008. [No change.]

§ 1042.830 Labeling. October 25, 2016. [No change.]

§ 1042.835 Certification of remanufactured engines. June 30, 2008. [No change.]

§ 1042.836 Marine certification of locomotive remanufacturing systems. June 29, 2021. [n/a]

§ 1042.840 Application requirements for remanufactured engines. October 25, 2016. [No change.]

§ 1042.845 Remanufactured engine families. June 30, 2008. [No change.]

§ 1042.850 Exemptions and hardship relief. October 25, 2016. [No change.]

Subpart J – Definitions and Other Reference Information

§ 1042.901 Definitions. January 24, 2023. [No change.]

§ 1042.905 Symbols, acronyms, and abbreviations. June 29, 2021. [No change.]

§ 1042.910 Incorporation by reference. June 29, 2021. [No change.]

§ 1042.915 Confidential information. [n/a]

Replace with the following: Any manufacturer claiming that some or all of the information submitted pursuant to title 13, CCR, Division 3, Chapter 9, Article 4 (Off-Road Compression-Ignition Engines and Equipment) is confidential should refer to the applicable regulations as provided by title 17, CCR, sections 91000, 91001, 91010, 91011, 91020, 91021, and 91022 and Government Code section 7927.705.

§ 1042.920 Hearings. June 30, 2008. [No change.]

§ 1042.925 Reporting and recordkeeping requirements. October 25, 2016. [No change.]

Appendix I to Part 1042 – Summary of Previous Emission Standards. January 24, 2023. [n/a]

Appendix II to Part 1042 – Steady-State Duty Cycles. October 25, 2016. [No change.]

Appendix III to Part 1042 – Not-to-Exceed Zones. October 25, 2016. [No change.]