Adopt incorporated “California Exhaust and Evaporative Emission Standards and Test Procedures for New 2013 and Later Small Off-Road Engines” (40 CFR, Part 1065) to read:

State of California
AIR RESOURCES BOARD

DRAFT PROPOSED CALIFORNIA EXHAUST AND EVAPORATIVE EMISSION STANDARDS AND TEST PROCEDURES FOR NEW 2013 AND LATER SMALL OFF-ROAD ENGINES

ENGINE-TESTING PROCEDURES
(MODIFIED PORTIONS OF PART 1065)

Adopted: [insert date of adoption]

NOTE: This document incorporates by reference portions of Title 40 of the Code of Federal Regulations (CFR) Part 1065 – Engine-Testing Procedures, Subparts A through K inclusive, as amended November 8, 2010; and, the internally referenced sections of Title 40 CFR, Parts 60, 80, 86, 90, 1054, and 1068. Sections that have been included in their entirety are set forth with the section number and title. California provisions that replace specific federal language provisions are denoted by the words "DELETE" for the federal language and "REPLACE WITH" or "ADD" for the California language. The symbols "* * * * *" and "..." mean that the remainder of the CFR text for a specific section is not shown in these procedures but has been incorporated by reference, with only the printed text changed. CFR sections that are not listed are not part of California's test procedures. If there is any conflict between the provisions of this document and the California Health and Safety Code, Division 26, or Title 13 of the California Code of Regulations (CCR), the Health and Safety Code and Title 13 apply.

This document is all newly adopted text.

CALIFORNIA EXHAUST AND EVAPORATIVE EMISSION STANDARDS AND TEST PROCEDURES FOR NEW 2013 AND LATER SMALL OFF-ROAD ENGINES

The following provisions of Part 1065, Title 40, Code of Federal Regulations, as promulgated by the United States Environmental Protection Agency on the date listed, are adopted and incorporated herein by this reference for 2013 model year and later small off-road engines as the California Exhaust Emission Standards and Test Procedures for New 2013 and Later Small Off-Road Engines, except as altered or replaced by the provisions set forth below.

PART 1065 – ENGINE-TESTING PROCEDURES

SOURCE: 75 FR 68462, November 8, 2010, unless otherwise noted.

Subpart A – Applicability and General Provisions

§ 1065.1 Applicability.

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(a) DELETE,
REPLACE WITH:
(a) (1) This part applies to 2013 and later model year small off-road engines regulated under Title 13, California Code of Regulations, Chapter 9, Article 1, and subject to the emission standards in § 2403(b)(1) of that Article. These provisions do not apply to engines and equipment that fall within the scope of the preemption of Section 209(e)(1)(A) of the Federal Clean Air Act, as amended, and as defined by regulation of the Environmental Protection Agency.

(2) Every new small off-road engine that is manufactured for sale, sold, offered for sale, introduced or delivered or imported into California for introduction into commerce and that is subject to any of the standards prescribed herein is required to be covered by an Executive Order issued pursuant to Article 1, Chapter 9, Title 13, California Code of Regulations, including these Test Procedures.

* * * * *

(d) DELETE,
REPLACE WITH:
Paragraph (a) of this section identifies the parts of the CFR that define emission standards and other requirements for particular types of engines. In this part, we refer

to each section of the Article 1, Chapter 9, Title 13, California Code of Regulations, and the incorporated CFR part 1054, generically as the ”standard-setting part.”

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(f) DELETE,
REPLACE WITH:
For vehicles or equipment subject to this part and regulated under vehicle-based or equipment-based standards, use good engineering judgment to interpret the term “engine” in this part to include vehicles or equipment, where appropriate.

(g) DELETE,
REPLACE WITH:
For additional information regarding these test procedures, visit our Web site at http://www.arb.ca.gov/msprog/offroad/sore/sore.htm

§ 1065.2 Submitting information to ARB under this part.

(a) DELETE.
REPLACE WITH:
You are responsible for statements and information in your applications for certification, requests for approved procedures, laboratory audits, production-line test reports, or any other statements you make to us related to this part 1065. If you provide statements or information to someone for submission to the Executive Officer, you are responsible for these statements and information as if you had submitted them to the Executive Officer yourself.

(b) DELETE,
REPLACE WITH:
In the standard-setting part, we describe your obligation to report truthful and complete information and the consequences of failing to meet this obligation. This obligation applies whether you submit this information directly to EPA or through someone else.

* * * * *

(f) DELETE.
REPLACE WITH:
Nothing in this part should be interpreted to limit our ability under Part 5, Division 26, California Health and Safety Code, including but not limited to sections 43013, 43018, 43101, 43102, and 43104 to verify that engines conform to the regulations.

§ 1065.5 Overview of this part 1065 and its relationship to the standard-setting part.

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§ 1065.10 Other procedures.

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(c) (5) DELETE,
REPLACE WITH:
You may ask for but must receive our approval to use emission data collected using other procedures, such as those of the federal Environmental Protection Agency or the International Organization for Standardization. We will approve this only if you show us that using these other procedures does not affect your ability to show compliance with the applicable emission standards.

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§ 1065.12 Approval of alternate procedures.

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(d) (1) DELETE,
REPLACE WITH:
Theoretical basis. Give a brief technical description explaining why you believe the proposed alternate procedure should result in emission measurements equivalent to those using the specified procedure. You may include equations, figures, and references. You should consider the full range of parameters that may affect equivalence. For example, for a request to use a different NO_X measurement procedure, you should theoretically relate the alternate detection principle to the specified detection principle over the expected concentration ranges for NO, NO2, and interference gases.

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§ 1065.15 Overview of procedures for laboratory and field testing.`

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(c) (2) (ii) DELETE,
REPLACE WITH:
Batch sampling. In batch sampling, continuously extract and store a sample of raw or dilute exhaust for later measurement. Extract a sample proportional to the raw or dilute exhaust flow rate. You may extract and store a proportional sample of exhaust in an appropriate container, such as a bag, and then measure HC, CO, and NO_X concentrations in the container after the test interval. Multiply batch sampled

concentrations by the total (raw or dilute) flow from which it was extracted during the test interval. This product is the total mass of the emitted constituent.

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§ 1065.20 Units of measure and overview of calculations.

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§ 1065.25 Recordkeeping.

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Subpart B – Equipment Specifications

§ 1065.101 Overview.

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§ 1065.110 Work inputs and outputs, accessory work, and operator demand.

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§ 1065.120 Fuel properties and fuel temperature and pressure.

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§ 1065.122 Engine cooling and lubrication.

(a) DELETE,
REPLACE WITH:
The use of auxiliary fans for engine cooling must be indicated in the application for certification. The manufacturer must detail the use of such fans and demonstrate that the supplemental cooling resulting from the use of the fans is representative of in-use engine operation. The records must be maintained by the manufacturer and must be made available to the Executive Officer upon request.

(b) DELETE

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§ 1065.125 Engine intake air.

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§ 1065.127 Exhaust gas recirculation.

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§ 1065.130 Engine exhaust.

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(g) DELETE

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§ 1065.140 Dilution for gaseous and PM constituents.

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(b) (2) (iii) DELETE

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(b) (3) DELETE

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(d) DELETE,
REPLACE WITH:
Partial-flow dilution (PFD). You may dilute a partial flow of raw or previously diluted exhaust before measuring emissions. Section 1065.240 describes PFD-related flow measurement instruments. PFD may consist of constant or varying dilution ratios as described in paragraphs (d)(2) and (3) of this section.

(1) *Applicability.*

(i) You may use PFD to extract a proportional raw exhaust sample for any batch or continuous gaseous emission sampling over any transient duty cycle, any steady-state duty cycle, or any ramped-modal cycle.

(ii) You may use PFD to extract a proportional diluted exhaust sample from a CVS for any batch or continuous emission sampling.

(iii) You may use PFD to extract a constant raw or diluted exhaust sample for any continuous emission sampling.

(iv) You may use PFD to extract a constant raw or diluted exhaust sample for any steady-state emission sampling.

(2) Constant dilution-ratio PFD. Do one of the following for constant dilution-ratio PFD:

(i) Dilute an already proportional flow.

(ii) Continuously measure constituent concentrations. For example, you might dilute to precondition a sample of raw exhaust to control its temperature, humidity, or constituent concentrations upstream of continuous analyzers. In this case, you must take into account the dilution ratio before multiplying the continuous concentration by the sampled exhaust flow rate.

(iii) Extract a proportional sample from a separate constant dilution ratio PFD system. For example, you might use a variable-flow pump to proportionally fill a gaseous storage medium such as a bag from a PFD system. In this case, the proportional sampling must meet the same specifications as varying dilution ratio PFD in paragraph (d)(3) of this section.

(3) Varying dilution-ratio PFD. All the following provisions apply for varying dilution-ratio PFD:

(i) Use a control system with sensors and actuators that can maintain proportional sampling over intervals as short as 200 ms (i.e., 5 Hz control).

(ii) For control input, you may use any sensor output from one or more measurements; for example, intake-air flow, fuel flow, exhaust flow, engine speed, and intake manifold temperature and pressure.

(iii) Account for any emission transit time in the PFD system, as necessary.

(iv) You may use preprogrammed data if they have been determined for the specific test site, duty cycle, and test engine from which you dilute emissions.

(v) We recommend that you run practice cycles to meet the validation criteria in §1065.545 but – regardless, you must validate every emission test by meeting the validation criteria with the data from that specific test. Data from previously validated practice cycles or other tests may not be used to validate a different emission test.

(vi) You may not use a PFD system that requires preparatory tuning or calibration with a CVS or with the emission results from a CVS. Rather, you must be able to independently calibrate the PFD.

(e) DELETE.

§ 1065.145 Gaseous and PM probes, transfer lines, and sampling system components.

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(b) (5) (iii) DELETE,
REPLACE WITH:
You must measure and proportion the sample flows from each stack with active flow controls.

(b) (5) (iv) DELETE.

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(b) (6) (i) (D) DELETE.

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(c) (3) DELETE.

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(d) DELETE,
REPLACE WITH:
Transfer lines. You may use transfer lines to transport an extracted sample from a probe to an analyzer, storage medium, or dilution system. Minimize the length of all transfer lines by locating analyzers, storage media, and dilution systems as close to probes as practical. We recommend that you minimize the number of bends in transfer lines and that you maximize the radius of any unavoidable bend. Avoid using 90° elbows, tees, and cross-fittings in transfer lines. Where such connections and fittings are necessary, take steps, using good engineering judgment, to ensure that you meet the temperature tolerances in this paragraph (d). This may involve measuring temperature at various locations within transfer lines and fittings. You may use a single transfer line to transport a sample of more than one constituent, as long as the transfer line meets all the specifications for each constituent. The following construction and temperature tolerances apply to transfer lines:

(1) Gaseous samples. Use transfer lines with inside surfaces of 300 series stainless steel, PTFE, Viton^{TM}, or any other material that you demonstrate has better properties for emission sampling. For raw exhaust sampling, use a non-reactive material capable of withstanding raw exhaust temperatures. You may use in-line filters if they do not react with exhaust constituents and if the filter and its housing meet the same temperature requirements as the transfer lines, as follows:

(i) For NO_X transfer lines upstream of either an NO_2-to-NO converter that meets the specifications of §1065.378 or a chiller that meets the specifications of §1065.376, maintain a sample temperature that prevents aqueous condensation.

(ii) For THC transfer lines for testing compression-ignition engines, 2-stroke spark-ignition engines, or 4-stroke spark-ignition engines below 19 kW, maintain a wall temperature tolerance throughout the entire line of (191 ±11) °C. If you sample from raw exhaust, you may connect an unheated, insulated transfer line directly to a probe. Design the length and insulation of the transfer line to cool the highest expected raw exhaust temperature to no lower than 191 °C, as measured at the transfer line's outlet. For dilute sampling, you may use a transition zone between the probe and transfer line of up to 92 cm to allow your wall temperature to transition to (191 ±11) °C.

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(e) (2) DELETE,
REPLACE WITH:
Sample dryer. You may use either type of sample dryer described in this paragraph (e)(2) to decrease the effects of water on gaseous emission measurements.

(i) Osmotic-membrane. You may use an osmotic-membrane dryer upstream of any gaseous analyzer or storage medium, as long as it meets the temperature specifications in paragraph (d)(1) of this section. Because osmotic-membrane dryers may deteriorate after prolonged exposure to certain exhaust constituents, consult with the membrane manufacturer regarding your application before incorporating an osmotic-membrane dryer. Monitor the dewpoint, T_{dew}, and absolute pressure, p_{total}, downstream of an osmotic-membrane dryer. You may use continuously recorded values of T_{dew} and p_{total} in the amount of water calculations specified in §1065.645. For our testing we may use average temperature and pressure values over the test interval or a nominal pressure value that we estimate as the dryer's average pressure expected during testing as constant values in the amount of water calculations specified in §1065.645. For your testing, you may use the maximum temperature or minimum pressure values observed during a test interval or duty cycle or the high alarm temperature setpoint or low alarm pressure setpoint as constant values in the calculations specified in §1065.645. For your testing, you may also use a nominal p_{total}, which you may estimate as the dryer's lowest absolute pressure expected during testing.

(ii) Thermal chiller. You may use a thermal chiller upstream of some gas analyzers and storage media. You may not use a thermal chiller upstream of a THC measurement system for compression-ignition engines, 2-stroke spark-ignition engines, or 4-stroke spark-ignition engines below 19 kW. If you use a thermal chiller upstream of an NO_2-to-NO converter or in a sampling system without an NO_2-to-NO converter, the chiller must meet the NO_2loss-performance check specified in §1065.376. Monitor the dewpoint, T_{dew}, and absolute pressure, p_{total}, downstream of a thermal chiller. You may use continuously recorded values of T_{dew} and p_{total} in the amount of water calculations specified in §1065.645. If it is valid to assume the degree of saturation in the thermal chiller, you may calculate T_{dew} based on the known chiller performance and continuous monitoring of chiller temperature, $T_{chiller}$. If it is valid to assume a constant temperature offset between $T_{chiller}$ and T_{dew}, due to a known and fixed amount of sample reheat between the chiller outlet and the temperature measurement location, you may factor in this assumed temperature offset value into emission calculations. If we ask for it, you must show by engineering analysis or by data the validity of any assumptions described by this paragraph (e)(2)(ii). For our testing we may use average temperature and pressure values over the test interval or a nominal pressure value that we estimate as the dryer's average pressure expected during testing as constant values in the calculations specified

in §1065.645. For your testing you may use the maximum temperature and minimum pressure values observed during a test interval or duty cycle or the high alarm temperature setpoint and the low alarm pressure setpoint as constant values in the amount of water calculations specified in §1065.645. For your testing you may also use a nominal p_{total}, which you may estimate as the dryer's lowest absolute pressure expected during testing.

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(f) DELETE.

§ 1065.150 Continuous sampling.

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§ 1065.170 Batch sampling for gaseous and PM constituents.

DELETE,
REPLACE WITH:
Batch sampling involves collecting and storing emissions for later analysis. Examples of batch sampling include collecting and storing gaseous emissions in a bag. You may use batch sampling to store emissions that have been diluted at least once in some way, such as with CVS, PFD, or BMD. You may use batch-sampling to store undiluted emissions.
(a) *Sampling methods.* If you extract from a constant-volume flow rate, sample at a constant-volume flow rate as follows:

(1) Validate proportional sampling after an emission test as described in §1065.545. Use good engineering judgment to select storage media that will not significantly change measured emission levels (either up or down). For example, do not use sample bags for storing emissions if the bags are permeable with respect to emissions or if they off-gas emissions to the extent that it affects your ability to demonstrate compliance with the applicable gaseous emission standards.
(b) *Gaseous sample storage media.* Store gas volumes in sufficiently clean containers that minimally off-gas or allow permeation of gases. Use good engineering judgment to determine acceptable thresholds of storage media cleanliness and permeation. To clean a container, you may repeatedly purge and evacuate a container and you may heat it. Use a flexible container (such as a bag) within a temperature-controlled environment, or use a temperature controlled rigid container that is initially evacuated or has a volume that can be displaced, such as a piston and cylinder arrangement. Use containers meeting the specifications in the following table, noting that you may request to use other container materials under §1065.10:

Table 1 of §1065.170—Gaseous Batch Sampling Container Materials

Emissions	Engines

	Compression-ignition, two-stroke spark ignition, 4-stroke spark-ignition <19 kW	**All other engines**
CO, CO_2, O_2, CH_4, C_2H_6, C_3H_8, NO, NO_2[1]	Tedlar™,[2] Kynar™,[2] Teflon™,[3] or 300 series stainless steel[3]	Tedlar™,[2] Kynar™,[2] Teflon™,[3] or 300 series stainless steel[3]
THC, NMHC	Teflon™[4] or 300 series stainless steel[4]	Tedlar™,[2] Kynar™,[2] Teflon™,[3] or 300 series stainless steel[3]

[1]As long as you prevent aqueous condensation in storage container.
[2]Up to 40 °C.
[3]Up to 202 °C.
[4]At (191 ±11) °C.

§ 1065.190 PM-stabilization and weighing environments for gravimetric analysis.

DELETE

§ 1065.195 PM-stabilization environment for in-situ analyzers.

DELETE

Subpart C – Measurement Instruments

§ 1065.201 Overview and general provisions.

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§ 1065.202 Data updating, recording, and control.

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§ 1065.205 Performance specifications for measurement instruments.

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Measurement of Engine Parameters and Ambient Conditions

§ 1065.210 Work input and output sensors.

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§ 1065.215 Pressure transducers, temperature sensors, and dewpoint sensors.

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Flow-Related Measurements

§ 1065.220 Fuel flow meter.

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§ 1065.225 Intake-air flow meter.

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§ 1065.230 Raw exhaust flow meter.

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(d) (1) DELETE.

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§ 1065.240 Dilution air and diluted exhaust flow meters.

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§ 1065.245 Sample flow meter for batch sampling.

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§ 1065.248 Gas divider.

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CO and CO_2 Measurements

§ 1065.250 Nondispersive infra-red analyzer.

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Hydrocarbon Measurements

§ 1065.260 Flame-ionization detector.

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§ 1065.265 Nonmethane cutter.

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§ 1065.267 Gas chromatograph.

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NO_x and N_2O Measurements

§ 1065.270 Chemiluminescent detector.

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§ 1065.272 Nondispersive ultraviolet analyzer.

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§ 1065.275 N_2O measurement devices.

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O_2 Measurements

§ 1065.280 Paramagnetic and magnetopneumatic O_2 detection analyzers.

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Air-to-Fuel Ratio Measurements

§ 1065.284 Zirconia (ZrO_2) analyzer.

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PM Measurements

§ 1065.290 PM gravimetric balance.

DELETE.

§ 1065.295 PM inertial balance for field testing analysis.

DELETE.

Subpart D –Calibrations and Verifications

§ 1065.301 Overview and general provisions.

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§ 1065.303 Summary of required calibration and verifications.

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§ 1065.305 Verifications for accuracy, repeatability, and noise.

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§ 1065.307 Linearity verification.

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(d) (9) DELETE.

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(e) (3) (i) DELETE.

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(e) (7) (i) (C) DELETE.

(e) (7) (i) (D) DELETE.

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§ 1065.308 Continuous gas analyzer system-response and updating-recording verification – for gas analyzers not continuously compensated for other gas species.

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§ 1065.309 Continuous gas analyzer system-response and updating-recording verification – for gas analyzers continuously compensated for other gas species.

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Measurement of Engine Parameters and Ambient Conditions

§ 1065.310 Torque calibration.

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§ 1065.315 Pressure, temperature, and dewpoint calibration.

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Flow-Related Measurements

§ 1065.320 Fuel-flow calibration.

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§ 1065.325 Intake-flow calibration.

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§ 1065.330 Exhaust-flow calibration.

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§ 1065.340 Diluted exhaust flow (CVS) calibration.

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§ 1065.341 CVS and batch sampler verification (propane check).

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§ 1065.342 Sample dryer verification.

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§ 1065.345 Vacuum-side leak verification.

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CO and CO_2 Measurements

§ 1065.350 H_2O interference verification for CO_2 NDIR analyzers.

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§ 1065.355 H_2O and CO_2 interference verification for CO NDIR analyzers.

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Hydrocarbon Measurements

§ 1065.360 FID optimization and verification.

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§ 1065.362 Non-stoichiometric raw exhaust FID O_2 interference verification.

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§ 1065.365 Nonmethane cutter penetration fractions.

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NO_x and N_2O Measurements

§ 1065.370 CLD CO_2 and H_2O quench verification.

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§ 1065.372 NDUV analyzer HC and H_2O interference verification.

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§ 1065.375 Interference verification for N_2O analyzers.

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§ 1065.376 Chiller NO_2 penetration.

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§ 1065.378 NO_2-to-NO converter conversion verification.

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PM Measurements

§ 1065.390 PM balance verifications and weighing process verification.

DELETE.

§ 1065.395 Inertial PM balance verifications.

DELETE.

Subpart E – Engine Selection, Preparation, and Maintenance

§ 1065.401 Test engine selection.

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ADD:
(c) Each manufacturer shall provide to the Executive Officer in the engine family certification application the reason for its test engine choice. In the event that the Executive Officer determines that the test engine configuration does not meet the requirements specified in paragraph (a), the Executive Officer will notify the manufacturer. Any disapproval must be accompanied by a statement of the reasons thereof. In the event of disapproval, the manufacturer may petition the California Air

Resources Board to review the decision of the Executive Officer as provided by regulation.

§ 1065.405 Test engine preparation and maintenance.

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§ 1065.410 Maintenance limits for stabilized test engines.

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§ 1065.415 Durability demonstration.

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Subpart F –Performing an Emission Test in the Laboratory

§ 1065.501 Overview.

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(a) (10) DELETE.

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§ 1065.510 Engine mapping.

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§ 1065.512 Duty cycle generation.

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§ 1065.514 Cycle-validation criteria for operation over specified duty cycles.

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§ 1065.520 Pre-test verification procedures and pre-test data collection.

(a) DELETE.

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(f) (3) DELETE

(f) (4) DELETE

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ADD:

(h) Engine pre-test preparation.

(1) Drain and charge the fuel tanks(s) with the specified test fuel to 50 percent of the tank's nominal capacity. If an external fuel tank is used, the engine fuel inlet system pressure must be typical of what the engine will see in use.

(2) (i) Operate the engine on the dynamometer measuring the fuel consumption (fuel consumption required only for raw gas sampling method) and torque before and after the emission sampling equipment is installed, including the sample probe, using the modes specified in the following table.

Engine class	Test cycle	Operating mode
(A) Engines greater than 80 cc displacement volume	A	6
(B) Engines greater than 80 cc displacement volume	B	1
(C) Engines less than or equal to 80 cc displacement volume	C	1

(ii) These modes are from the Appendix II to Part 1054 --Duty Cycles for Laboratory Testing. The emission sampling equipment may not significantly affect the operational characteristics of the engine (typically the results should agree within five percent).

§ 1065.525 Engine starting, restarting, and shutdown, and optional repeating of void discrete modes.

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(g) (2) DELETE.

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§ 1065.526 Repeating void modes or test intervals.

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§ 1065.530 Emission test sequence.

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§ 1065.545 Validation of proportional flow control for batch sampling.

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§ 1065.546 Validation of minimum dilution ration for PM batch sampling.

DELETE.

§ 1065.550 Gas analyzer range validation, drift validation, and drift correction.

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§ 1065.590 PM sampling media (e.g., filters) preconditioning and tare weighing.

DELETE.

§ 1065.595 PM sample post-conditioning and total weighing.

DELETE.

Subpart G –Calculations and Data Requirements

§ 1065.601 Overview.

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(b) DELETE,
REPLACE WITH:
You may use data from multiple systems to calculate test results for a single emission test, consistent with good engineering judgment. You may also make multiple measurements from a single batch sample. You may not use test results from multiple emission tests to report emissions. We allow weighted means where appropriate. You may discard statistical outliers, but you must report all results.

(c) DELETE.

§ 1065.602 Statistics.

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§ 1065.610 Duty cycle generation.

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§ 1065.630 1980 international gravity formula.

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§ 1065.640 Flow meter calibration calculations.

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§ 1065.642 SSV, CFV, and PDP molar flow rate calculations.

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§ 1065.644 Vacuum-decay leak rate.

§ 1065.645 Amount of water in an ideal gas.

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§ 1065.650 Emission calculations.

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(c) (3) (i) DELETE,
REPLACE WITH:
Varying flow rate. If you collect a batch sample from a changing exhaust flow rate, extract a sample proportional to the changing exhaust flow rate. We consider the following to be examples of changing flows that require proportional sampling: Raw exhaust, exhaust diluted with a constant flow rate of dilution air, and CVS dilution with a CVS flowmeter that does not have an upstream heat exchanger or electronic flow control. Integrate the flow rate over a test interval to determine the total flow from which you extracted the proportional sample. Multiply the mean concentration of the batch sample by the total flow from which the sample was extracted. If the total emission is a molar quantity, convert this quantity to a mass by multiplying it by its molar mass, M . The result is the mass of the emission, m. Calculate m for batch sampling with variable flow using the following equation:

$$m = M \cdot \bar{x} \cdot \sum_{i=1}^{N} \dot{n}_i \cdot \Delta t \qquad \text{Eq. 1065.650-6}$$

Example:
M_{NOx}= 46.0055 g/mol
N = 9000
x_{NOx}= 85.6 µmol/mol = 85.6 · 10^{-6}mol/mol
n_{dexh1}= 25.534 mol/s
n_{dexh2}= 26.950 mol/s

f_{record}= 5 Hz
Using Eq. 1065.650–5,
Δ t = 1/5 = 0.2
m_{NOx}= 46.0055 · 85.6 · 10^{-6}· (25.534 + 26.950 + ... + $n_{exh9000}$) · 0.2
m_{NOx}= 4.201 g

(c) (3) (ii) DELETE,
REPLACE WITH:
Constant flow rate. If you batch sample from a constant exhaust flow rate, extract a sample at a proportional or constant flow rate. We consider the following to be examples of constant exhaust flows: CVS diluted exhaust with a CVS flow meter that has either an upstream heat exchanger, electronic flow control, or both. Determine the mean molar flow rate from which you extracted the constant flow rate sample. Multiply the mean concentration of the batch sample by the mean molar flow rate of the exhaust from which the sample was extracted, and multiply the result by the time of the test interval. If the total emission is a molar quantity, convert this quantity to a mass by multiplying it by its molar mass, *M*. The result is the mass of the emission, *m*. Calculate *m* for sampling with constant flow using the following equations:

$$m = M \cdot \bar{x} \cdot \bar{\dot{n}} \cdot \Delta t$$ Eq. 1065.650-7

and for any other analysis of a batch sample that yields a mass per mole of sample,

$$\overline{M} = M \cdot \bar{x}$$ Eq. 1065.650-8

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(c) (4) (i) DELETE,
REPLACE WITH:
For sampling with a constant dilution ratio (*DR*) of diluted exhaust versus exhaust flow, calculate m using the following equation:

$$m = m_{dil} \cdot (DR)$$ Eq. 1065.650-9

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(e) (1) DELETE,
REPLACE WITH:
To calculate *m*, multiply its mean concentration, *x*, by its corresponding mean molar flow rate, *n*. If the result is a molar flow rate, convert this quantity to a mass rate by multiplying it by its molar mass, *M*. The result is the mean mass rate of the emission, *m*. Calculate *m* using the following equation:

$$\overline{\dot{m}} = M \cdot \bar{x} \cdot \bar{\dot{n}}$$ Eq. 1065.650-12

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ADD:

(i) For PM testing, engine manufacturers must use the particulate sampling test procedure specified in International Organization for Standardization (ISO) test procedure 8178-1 RIC engines - Exhaust emissions measurement, Part I: Test bed measurement of gaseous and particulate exhaust emission from RIC engines, Version N124, November 11, 1992; or any similar procedure that has been approved by the Executive Officer. For two-stroke engines, engine manufacturers may, in lieu of testing, determine PM emissions through the following equation:

$$PM_{est} = \frac{HC}{\text{Fuel to oil ratio}}$$

Where HC = weighted hydrocarbons in g/kW-hr, and
Fuel to oil ratio = the fuel to oil ratio used in the test engine.
Engine manufacturers may report this estimate as PM_{est}, and indicate that the PM emissions were estimated as per this paragraph.

§ 1065.655 Chemical balances of fuel, intake air, and exhaust.

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§ 1065.659 Removed water correction.

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§ 1065.660 THC, NMHC, and CH_4 determination.

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§ 1065.665 THCE and NMHCE determination.

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§ 1065.667 Dilution air background emission correction.

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(a) DELETE,
REPLACE WITH:
To determine the mass of background emissions to subtract from a diluted exhaust sample, first determine the total flow of dilution air, n_{dil}, over the test interval. This may be a measured quantity or a quantity calculated from the diluted exhaust flow and the flow-weighted mean fraction of dilution air in diluted exhaust, $x_{dil/exh}$. Multiply the total flow of dilution air by the mean concentration of a background emission. This may be a time-weighted mean or a flow-weighted mean (e.g., a proportionally sampled background). The product of n_{dil} and the mean concentration of a background emission is the total amount of a background emission. If this is a molar quantity, convert it to a

mass by multiplying it by its molar mass, *M*. The result is the mass of the background emission, *m*. Subtract total background masses from total mass to correct for background emissions.

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§ 1065.670 NO_x intake-air humidity and temperature corrections.

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§ 1065.672 Drift correction.

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§ 1065.675 CLD quench verification calculations.

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§ 1065.690 Buoyancy correction for PM sample media.

DELETE

§ 1065.695 Data requirements.

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(c) (1) DELETE,
REPLACE WITH:
What approved alternate procedures did you use? For example:
(i) Federal EPA test procedures.
(ii) ISO test procedures.

* * * * *

(c) (3) DELETE,
REPLACE WITH:
What measurement instruments did you use? For example, the make, model, and description of the following:
(i) Speed and torque instruments.
(ii) Flow meters.
(iii) Gas analyzers.

* * * * *

(c) (8) DELETE,
REPLACE WITH:
How did you validate your testing? For example, results from the following:
(i) Duty cycle regression statistics for each test interval.
(ii) Proportional sampling.
(iii) Drift.

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

§ 1065.701 General requirements for test fuels.

(a) DELETE,
REPLACE WITH:
(a) (1) Except as allowed in § 1065.120 (a) (2), the certification test fuel used for emission testing must be consistent with the fuel specifications as outlined in the California Code of Regulations, Title 13, Section 1961.2, and "California Exhaust Emission Standards and Test Procedures for [Model Year to be determined] and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles", last amended [To be determined], incorporated by reference herein. The test fuel specification should remain consistent from batch to batch. If a particular engine requires a different octane (or cetane) fuel, test records should indicate the fuel used.
(2) A manufacturer may choose to use a test fuel with up to ten percent ethanol by volume for certification testing, provided that the same fuel has been approved for federal certification testing.

(b) DELETE,
REPLACE WITH:
With Executive Officer approval, the certifying entity may use other test fuels so long as they do not affect the demonstration of compliance.

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(f) DELETE,
REPLACE WITH:
Test fuels–service accumulation and aging.
(1) Gasoline.
(i) Unleaded gasoline representative of commercial gasoline generally available through retail outlets must be used in service accumulation and aging for gasoline-fueled spark-ignition engines. As an alternative, the certification test fuels specified under paragraph (b) of this section may be used for engine service

accumulation and aging. Leaded fuel may not be used during service accumulation or aging.

(ii) The octane rating of the gasoline used must be no higher than 4.0 Research Octane Numbers above the minimum recommended by the engine manufacturer when a certification fuel is not used for service accumulation, and must have a minimum sensitivity of 7.5 Octane Numbers. Sensitivity is the Research Octane Number minus the Motor Octane Number.

(iii) The Reid Vapor Pressure of a gasoline must be characteristic of the engine fuel during the season in which the service accumulation takes place in the outdoors, or must be characteristic of the engine fuel appropriately suited to the ambient conditions of an indoor test cell in which the entire service accumulation takes place.

(2) Alternative fuels

(i) Liquefied petroleum gas meeting the ASTM D1835 (11/10/1997) or NGPA HD-5 (1970) specifications must be used for service accumulation.

(ii) Natural gas representative of commercial natural gas that is available locally to the manufacturer's test site may be used in service accumulation. The manufacturer must provide the Executive Officer with detail of how the commercial natural gas differs from the certification test fuel specifications.

§ 1065.703 Distillate diesel fuel.

DELETE

§ 1065.705 Residual and intermediate residual fuel.

DELETE

§ 1065.710 Gasoline.

DELETE

§ 1065.715 Natural gas.

DELETE

§ 1065.720 Liquefied petroleum gas.

DELETE

§ 1065.740 Lubricants.

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ADD:
(c) During all engine tests, the engine shall employ a lubricating oil consistent with the engine manufacturer's specifications for that particular engine. These specifications shall be recorded and declared in the certification application.

§ 1065.745 Coolants.

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§ 1065.750 Analytical gases.

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§ 1065.790 Mass standards.

DELETE.

Subpart I – Testing with Oxygenated Fuels

§ 1065.801 Applicability.

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§ 1065.805 Sampling system.

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§ 1065.845 Response factor determination.

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§ 1065.850 Calculations.

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Subpart J – Field Testing and Portable Emission Measurement Systems

§ 1065.901 Applicability.

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§ 1065.905 General provisions.

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(d) (2) (i) DELETE.

(d) (2) (ii) DELETE.

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(d) (6) DELETE,
REPLACE WITH:
Use the procedures in §§1065.930 and 1065.935 to start and run a field test.

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§ 1065.910 PEMS auxiliary equipment for field testing.

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§ 1065.915 PEMS instruments.

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§ 1065.920 PEMS calibrations and verifications.

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§ 1065.925 PEMS preparation for field testing.

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(g) DELETE.

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§ 1065.930 Engine starting, restarting, and shutdown.

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§ 1065.935 Emission test sequence for field testing.

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(g) (6) DELETE.

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§ 1065.940 Emission calculations.

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Subpart K – Definitions and Other Reference Information

§ 1065.1001 Definitions.

ADD:
The definitions in Section 2401, Chapter 9, Title 13 of the California Code of Regulations, 40 CFR 1054.801, and 1068.30 apply with the following additions:

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Act DELETE.

Adjustable parameter DELETE,
REPLACE WITH:
Adjustable parameter means any device, system, or element of design that someone can adjust (including those which are difficult to access) and that, if adjusted, may affect emissions or engine performance during emission testing or normal in-use operation. This includes, but is not limited to, parameters related to injection timing and fueling rate. You may ask us to exclude a parameter that is difficult to access if it cannot be adjusted to affect emissions without significantly degrading engine performance, or if you otherwise show us that it will not be adjusted in a way that affects emissions during in-use operation.

* * * * *

Aftertreatment DELETE,
REPLACE WITH:
Aftertreatment means relating to a catalytic converter, particulate filter, thermal reactor, or any other system, component, or technology mounted downstream of the exhaust valve (or exhaust port) whose design function is to decrease emissions in the engine exhaust before it is exhausted to the environment. Exhaust-gas recirculation (EGR), turbochargers, and oxygen sensors are not aftertreatment.

* * * * *

Applicable standard DELETE,
REPLACE WITH:
Applicable emission standard or *applicable standard* means an emission standard to which an engine (or equipment) is subject. Additionally, if an engine (or equipment) has been or is being certified to another standard or FEL, *applicable emission standard* means the FEL or other standard to which the engine (or equipment) has been or is being certified.

* * * * *

Brake power DELETE,
REPLACE WITH:
Brake power means the usable power output of the engine, not including power required to fuel, lubricate, or heat the engine, circulate coolant to the engine, or to operate aftertreatment devices.

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Calibration DELETE,
REPLACE WITH:
Calibration means the set of specifications and tolerances specific to a particular design, version, or application of a component or assembly capable of functionally describing its operation over its working range.

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ADD:
Certificate of Conformity means an Executive Order issued in accordance with the California Health and Safety Code, Division 26, Part 5.

Certification DELETE,
REPLACE WITH:
Certification means, with respect to new small off-road engines, obtaining an executive order for an engine family complying with the small off-road engine emission standards and requirements specified in the California Code of Regulations, Title 13, Chapter 9, Sections 2400-2409.

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Designated Compliance Officer DELETE,
REPLACE WITH:
Designated Compliance Officer means the Executive Officer of the Air Resources Board, or a designee of the Executive Officer.

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Discrete-mode DELETE,
REPLACE WITH:
Discrete-mode means relating to the discrete-mode type of steady-state test described in §1054.505.

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Engine DELETE,

REPLACE WITH:
Engine as used in this part, refers to small off-road engine.

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ADD:
EPA means Air Resources Board.

ADD:
Executive Order means an order issued by the Executive Officer of the Air Resources Board or his or her delegate certifying engines for sale in California.

* * * * *

Fuel type DELETE,
REPLACE WITH:
Fuel type means a general category of fuels such as gasoline or natural gas. There can be multiple grades within a single fuel type, such as low-temperature or all-season gasoline.

Good engineering judgment DELETE.

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Hydrocarbon DELETE,
REPLACE WITH:
Hydrocarbon (HC) means the hydrocarbon group on which the emission standards are based for each fuel type, as described in subpart B of 40 CFR 1054.

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Manufacturer DELETE.

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Nonroad engine DELETE,
REPLACE WITH:
Nonroad engine means a small off-road engine as defined in the California Code of Regulations, Title 13, Chapter 9, Section 2401.

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Ramped-modal DELETE,

REPLACE WITH:
Ramped-modal means ramped-modal type of steady-state test, as described in 40 CFR 1054.

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ADD:
Small volume engine manufacturer means any engine manufacturer whose total production of small off-road engines slated for sale in California are projected at the time of certification of a given model year to be no more than 500 engines.

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Steady-state DELETE,
REPLACE WITH:
Steady-state means relating to emission tests in which engine speed and load are held at a finite set of essentially constant values. Steady-state tests are either discrete-mode tests or ramped-modal tests.

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Test sample DELETE,
REPLACE WITH:
Test sample means the collection of engines selected from the population of an emission family for emission testing. This may include testing for certification, production-line testing, or in-use testing.

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United States DELETE.

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Useful life DELETE,
REPLACE WITH:
Useful life means the period during which the engine and equipment are designed to properly function in terms of power output and intended function, without being remanufactured, specified as a number of hours of operation or calendar years, whichever comes first. It is the period during which an off-road engine must comply with all applicable emission standards. If an engine has no hour meter, the specified number of hours does not limit the period during which an in-use engine is required to comply with emission standards unless the degree of service accumulation can be verified separately.

* * * * *

We (us, our) DELETE,
REPLACE WITH:
We (us, our) means the Executive Officer of the Air Resources Board or a designee of the Executive Officer.

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§ 1065.1005 Symbols, abbreviations, acronyms, and units of measure.

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§ 1065.1010 Reference materials.

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