

**PART 6**

**FINAL REGULATION ORDER TEST PROCEDURES**

**Part I – C**

**(Parts 1039/1065/1068)**

**(2008 – 2010 Model Years)**

**Tier 4 Off-Road Compression-Ignition Engines**

This Page Left Intentionally Blank

## FINAL REGULATION ORDER TEST PROCEDURES

Note: This appendix shows the entirety of regulatory amendments to the test procedures titled below, which were approved by the Air Resources Board on December 16, 2011, and refined via subsequent conforming modifications authorized under Resolution 11-41. The source for these test procedures is Part 1039 of the “California Exhaust Emission Standards and Test Procedures for New 2008 and Later Tier 4 Off-Road Compression-Ignition Engines, Part I-C” (Part I-C), adopted October 20, 2005. These amendments are formatted in a style to indicate changes from the existing test procedures. All existing language is indicated by plain type. All additions to the existing language are indicated by underlined type (except that some existing headings within the test procedures were underlined originally for emphasis, and remain so, and thus do not constitute new language). All deletions to the existing language are indicated by ~~strikeout~~. Only those sections containing the modifications from the existing language are included. All other portions remain unchanged and are indicated by the notation [ \* \* \* \* \* ] for reference. 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 Page Left Intentionally Blank

**State of California**  
**AIR RESOURCES BOARD**

**California Exhaust Emission Standards and Test Procedures for New 2008-2010  
and ~~Later~~ Tier 4 Off-Road Compression-Ignition Engines**

PART I-C

Adopted: October 20, 2005

Amended: October 25, 2012

## Table of Contents

PART 1039 – CONTROL OF EMISSIONS FROM NEW AND IN-USE <del>NONROAD</del> <u>OFF-ROAD</u> COMPRESSION-IGNITION ENGINES .....	1
Subpart A – Overview and Applicability.....	1
§ 1039.1 Does this part apply for my engines?.....	1
§ 1039.5 Which engines are excluded from this part’s requirements?.....	2
§ 1039.10 How is this part organized?.....	22
§ 1039.15 Do any other regulation parts apply to me? .....	2
§ 1039.20 What requirements from this part apply to excluded stationary engines? .....	2
Subpart B – Emission Standards and Related Requirements .....	3
§ 1039.101 What exhaust emission standards must my engines meet after the 2014 model year? .....	3
§ 1039.102 What exhaust emission standards and phase-in allowances apply for my engines in model year 2014 and earlier? .....	6
§ 1039.104 Are there interim provisions that apply only for a limited time? .....	9
§ 1039.105 What smoke standards must my engines meet? .....	13
§ 1039.107 What evaporative emission standards and requirements apply? .....	13
§ 1039.110 [Reserved] .....	13
§ 1039.115 What other requirements must my engines meet? .....	13
§ 1039.120 What emission-related warranty requirements apply to me? .....	13
§ 1039.125 What maintenance instructions must I give to buyers? .....	14
§ 1039.130 What installation instructions must I give to equipment manufacturers? .....	14
§ 1039.135 How must I label and identify the engines I produce?.....	14
§ 1039.140 What is my engine’s maximum engine power? .....	15
Subpart C – Certifying Engine Families.....	15
§ 1039.201 What are the general requirements for obtaining an Executive Order? .....	15
§ 1039.205 What must I include in my application?.....	15
§ 1039.210 May I get preliminary approval before I complete my application? ..	16
§ 1039.220 How do I amend the maintenance instructions in my application?...	16
§ 1039.225 How do I amend my application for certification to include new or modified engines or to change an FEL? .....	16
§ 1039.230 How do I select engine families? .....	16
§ 1039.235 What emission testing must I perform for my application for an Executive Order? .....	17
§ 1039.240 How do I demonstrate that my engine family complies with exhaust emission standards? .....	17

§ 1039.245	How do I determine deterioration factors from exhaust durability testing? .....	17
§ 1039.250	What records must I keep and what reports must I send to the Air Resources Board (ARB)? .....	18
§ 1039.255	What decisions may ARB make regarding my Executive Order? ....	18
Subpart D – [Reserved].....		18
Subpart E – In-use Testing.....		18
§ 1039.401	General Provisions. ....	18
Subpart F – Test Procedures .....		18
§ 1039.501	How do I run a valid emission test? .....	18
§ 1039.505	How do I test engines using steady-state duty cycles, including ramped-modal testing? .....	19
§ 1039.510	Which duty cycles do I use for transient testing? .....	19
§ 1039.515	What are the test procedures related to not-to-exceed limits? .....	19
§ 1039.520	What testing must I perform to establish deterioration factors? .....	19
§ 1039.525	How do I adjust emission levels to account for infrequently regenerating aftertreatment devices? .....	19
Subpart G – Special Compliance Provisions.....		20
§ 1039.601	What compliance provisions apply to these engines? .....	20
§ 1039.605	What provisions apply to engines already certified under the motor-vehicle program? .....	20
§ 1039.610	What provisions apply to vehicles already certified under the motor-vehicle program? .....	20
§ 1039.615	What special provisions apply to engines using noncommercial fuels? .....	20
§ 1039.620	What are the provisions for exempting engines used solely for competition? .....	21
§ 1039.625	What requirements apply under the program for equipment-manufacturer flexibility? .....	21
§ 1039.626	What special provisions apply to equipment imported under the equipment-manufacturer flexibility program? .....	26
§ 1039.627	What are the incentives for equipment manufacturers to use cleaner engines? .....	26
§ 1039.630	What are the economic hardship provisions for equipment manufacturers? .....	26
§ 1039.635	What are the hardship provisions for engine manufacturers? .....	27
§ 1039.640	What special provisions apply to branded engines? .....	27
§ 1039.645	What special provisions apply to engines used for transportation refrigeration units? .....	27
§ 1039.650	[Reserved] .....	29
§ 1039.655	What special provisions apply to engines sold in Guam, American Samoa, or the Commonwealth of the Northern Mariana Islands? ...	29

§ 1039.660	What special provisions apply to Independent Commercial Importers?.....	29
Subpart H – Averaging, Banking, and Trading for Certification .....		29
§ 1039.701	General provisions.....	29
§ 1039.705	How do I generate and calculate emission credits? .....	30
§ 1039.710	How do I average emission credits? .....	30
§ 1039.715	How do I bank emission credits? .....	30
§ 1039.720	How do I trade emission credits?.....	30
§ 1039.725	What must I include in my application for certification? .....	30
§ 1039.730	What ABT reports must I send to ARB?.....	30
§ 1039.735	What records must I keep? .....	30
§ 1039.740	What restrictions apply for using emission credits? .....	31
§ 1039.745	What can happen if I do not comply with the provisions of this subpart? .....	32
Subpart I – Definitions and Other Reference Information.....		32
§ 1039.801	What definitions apply to this part? .....	32
§ 1039.805	What symbols, acronyms, and abbreviations does this part use? ...	37
§ 1039.810	What materials does this part reference? .....	37
§ 1039.815	What provisions apply to confidential information? .....	37
§ 1039.820	How do I request a hearing? .....	37
Appendix I to Part 1039 – [Reserved].....		38
Appendix II to Part 1039 – Steady-state Duty Cycles for Constant-Speed Engines.....		38
Appendix III to Part 1039 – Steady-state Duty Cycles for Variable-Speed Engines with Maximum Power below 19 kW.....		38
Appendix IV to Part 1039 – Steady-state Duty Cycles for Variable-Speed Engines with Maximum Power at or above 19 kW .....		38
Appendix V to Part 1039 – [Reserved] .....		38
Appendix VI to Part 1039 – Nonroad Compression-Ignition Composite Transient Cycle		39
<b>PART 1065 – ENGINE-TESTING PROCEDURES .....</b>		<b>40</b>
Subpart A – Applicability and General Provisions .....		40
§ 1065.1	Applicability.....	40
§ 1065.2	Submitting information to ARB under this part.....	41
§ 1065.5	Overview of this part 1065 and its relationship to the standard-setting part. ....	41
§ 1065.10	Other procedures.....	41
§ 1065.12	Approval of alternate procedures.....	41
§ 1065.15	Overview of procedures for laboratory and field testing.....	41
§ 1065.20	Units of measure and overview of calculations.....	41
§ 1065.25	Recordkeeping.....	41



Subpart B – Equipment Specifications .....	42
§ 1065.101 Overview.....	42
§ 1065.110 Work inputs and outputs, accessory work, and operator demand. ..	42
§ 1065.120 Fuel properties and fuel temperature and pressure.....	42
§ 1065.122 Engine cooling and lubrication.....	42
§ 1065.125 Engine intake air.....	42
§ 1065.127 Exhaust gas recirculation.....	42
§ 1065.130 Engine exhaust.....	43
§ 1065.140 Dilution for gaseous and PM constituents.....	42
§ 1065.145 Gaseous and PM probes, transfer lines, and sampling system components. ....	43
§ 1065.150 Continuous sampling. ....	43
§ 1065.170 Batch sampling for gaseous and PM constituents. ....	43
§ 1065.190 PM-stabilization and weighing environments for gravimetric analysis. ....	43
§ 1065.195 PM-stabilization environment for in-situ analyzers.....	43
Subpart C – Measurement Instruments.....	43
§ 1065.201 Overview and general provisions.....	44
§ 1065.202 Data updating, recording, and control.....	44
§ 1065.205 Performance specifications for measurement instruments. ....	44
Measurement of Engine Parameters and Ambient Conditions .....	44
§ 1065.210 Work input and output sensors. ....	44
§ 1065.215 Pressure transducers, temperature sensors, and dewpoint sensors. ....	44
Flow-Related Measurements.....	44
§ 1065.225 Intake-air flow meter. ....	44
§ 1065.230 Raw exhaust flow meter.....	45
§ 1065.240 Dilution air and diluted exhaust flow meters.....	45
§ 1065.245 Sample flow meter for batch sampling.....	45
§ 1065.248 Gas divider.....	45
CO and CO <sub>2</sub> Measurements.....	45
§ 1065.250 Nondispersive infra-red analyzer. ....	45
Hydrocarbon Measurements .....	45
§ 1065.260 Flame-ionization detector.....	45
§ 1065.265 Nonmethane cutter. ....	45
§ 1065.267 Gas chromatograph.....	46
NO <sub>x</sub> Measurements .....	46
§ 1065.270 Chemiluminescent detector. ....	46
§ 1065.272 Nondispersive ultraviolet analyzer. ....	46
O <sub>2</sub> Measurements.....	46
§ 1065.280 Paramagnetic and magnetopneumatic O <sub>2</sub> detection analyzers. ....	46
Air-to-Fuel Ratio Measurements.....	46
§ 1065.284 Zirconia (ZrO <sub>2</sub> ) analyzer.....	46

PM Measurements .....	46
§ 1065.290 PM gravimetric balance. ....	46
§ 1065.295 PM inertial balance for field testing analysis. ....	47
Subpart D – Calibrations and Verifications.....	47
§ 1065.301 Overview and general provisions.....	47
§ 1065.303 Summary of required calibration and verifications. ....	47
§ 1065.305 Verifications for accuracy, repeatability, and noise. ....	47
§ 1065.307 Linearity verification. ....	47
§ 1065.308 Continuous gas analyzer system-response and updating-recording verification.....	47
§ 1065.309 Continuous gas analyzer uniform response verification.....	47
Measurement of Engine Parameters and Ambient Conditions .....	48
§ 1065.310 Torque calibration. ....	48
§ 1065.315 Pressure, temperature, and dewpoint calibration.....	48
Flow-Related Measurements.....	48
§ 1065.320 Fuel-flow calibration.....	48
§ 1065.325 Intake-flow calibration. ....	48
§ 1065.330 Exhaust-flow calibration. ....	48
§ 1065.340 Diluted exhaust flow (CVS) calibration.....	48
§ 1065.341 CVS and batch sampler verification (propane check).....	48
§ 1065.345 Vacuum-side leak verification. ....	49
CO and CO <sub>2</sub> Measurements.....	49
§ 1065.350 H <sub>2</sub> O interference verification for CO <sub>2</sub> NDIR analyzers. ....	49
§ 1065.355 H <sub>2</sub> O and CO <sub>2</sub> interference verification for CO NDIR analyzers. ....	49
Hydrocarbon Measurements .....	49
§ 1065.360 FID optimization and verification.....	49
§ 1065.362 Non-stoichiometric raw exhaust FID O <sub>2</sub> interference verification. ....	49
§ 1065.365 Nonmethane cutter penetration fractions.....	49
NO <sub>x</sub> Measurements .....	49
§ 1065.370 CLD CO <sub>2</sub> and H <sub>2</sub> O quench verification. ....	49
§ 1065.372 NDUV analyzer HC and H <sub>2</sub> O interference verification. ....	50
§ 1065.376 Chiller NO <sub>2</sub> penetration. ....	50
§ 1065.378 NO <sub>2</sub> -to-NO converter conversion verification.....	50
PM Measurements .....	50
§ 1065.390 PM balance verifications and weighing process verification. ....	50
§ 1065.395 Inertial PM balance verifications. ....	50
Subpart E – Engine Selection, Preparation, and Maintenance.....	50
§ 1065.401 Test engine selection.....	50
§ 1065.405 Test engine preparation and maintenance.....	51
§ 1065.410 Maintenance limits for stabilized test engines.....	51
§ 1065.415 Durability demonstration. ....	51

Subpart F – Performing an Emission Test in the Laboratory.....	51
§ 1065.501 Overview.....	51
§ 1065.510 Engine mapping.....	51
§ 1065.512 Duty cycle generation.....	51
§ 1065.514 Cycle-validation criteria.....	51
§ 1065.520 Pre-test verification procedures and pre-test data collection.....	51
§ 1065.525 Engine starting, restarting, and shutdown.....	52
§ 1065.530 Emission test sequence.....	52
§ 1065.545 Validation of proportional flow control for batch sampling.....	52
§ 1065.550 Gas analyzer range validation, drift validation, and drift correction..	52
§ 1065.590 PM sample preconditioning and tare weighing.....	52
§ 1065.595 PM sample post-conditioning and total weighing.....	52
Subpart G – Calculations and Data Requirements.....	52
§ 1065.601 Overview.....	52
§ 1065.602 Statistics.....	53
§ 1065.610 Duty cycle generation.....	53
§ 1065.630 1980 international gravity formula.....	53
§ 1065.640 Flow meter calibration calculations.....	53
§ 1065.642 SSV, CFV, and PDP molar flow rate calculations.....	53
§ 1065.645 Amount of water in an ideal gas.....	53
§ 1065.650 Emission calculations.....	53
§ 1065.655 Chemical balances of fuel, intake air, and exhaust.....	53
§ 1065.659 Removed water correction.....	54
§ 1065.660 THC and NMHC determination.....	54
§ 1065.665 THCE and NMHCE determination.....	54
§ 1065.667 Dilution air background emission correction.....	54
§ 1065.670 NO <sub>x</sub> intake-air humidity and temperature corrections.....	54
§ 1065.672 Drift correction.....	54
§ 1065.675 CLD quench verification calculations.....	54
§ 1065.690 Buoyancy correction for PM sample media.....	54
§ 1065.695 Data requirements.....	55
Subpart H – Engine Fluids, Test Fuels, Analytical Gases and Other Calibration	
Standards.....	55
§ 1065.701 General requirements for test fuels.....	55
§ 1065.703 Distillate diesel fuel.....	55
§ 1065.705 Residual fuel [Reserved].....	55
§ 1065.710 Gasoline.....	56
§ 1065.715 Natural gas.....	56
§ 1065.720 Liquefied petroleum gas.....	56
§ 1065.740 Lubricants.....	56
§ 1065.745 Coolants.....	56

§ 1065.750	Analytical gases.....	56
§ 1065.790	Mass standards. ....	56
Subpart I – Testing with Oxygenated Fuels.....		56
§ 1065.801	Applicability.....	57
§ 1065.805	Sampling system. ....	57
§ 1065.845	Response factor determination.....	57
§ 1065.850	Calculations. ....	57
Subpart J – Field Testing and Portable Emission Measurement Systems.....		57
Subpart K – Definitions and Other Reference Information .....		57
§ 1065.1001	Definitions.....	57
§ 1065.1005	Symbols, abbreviations, acronyms, and units of measure.....	58
§ 1065.1010	Reference materials.....	58
<b>PART 1068 – GENERAL COMPLIANCE PROVISIONS FOR <u>NONROAD OFF-ROAD</u></b>		
<b>PROGRAMS.....</b>		<b>59</b>
Subpart A – Applicability and Miscellaneous Provisions .....		59
§ 1068.1	Does this part apply to me? .....	59
§ 1068.5	How must manufacturers apply good engineering judgment? .....	60
§ 1068.10	What provisions apply to confidential information? .....	60
§ 1068.15	Who is authorized to represent the Air Resources Board? .....	60
§ 1068.20	May ARB enter my facilities for inspections? .....	60
§ 1068.25	What information must I give to ARB? .....	63
§ 1068.27	May ARB conduct testing with my production engines? .....	63
§ 1068.30	What definitions apply to this part? .....	63
§ 1068.35	What symbols, acronyms, and abbreviations does this part use? ..	65
Subpart B – Prohibited Actions and Related Requirements.....		65
§ 1068.101	What general actions does this regulation prohibit? .....	65
§ 1068.105	What other provisions apply to me specifically if I manufacture equipment needing certified engines? .....	69
§ 1068.110	What other provisions apply to engines in service? .....	69
§ 1068.115	When must manufacturers honor emission-related warranty claims? .....	70
§ 1068.120	What requirements must I follow to rebuild engines? .....	70
§ 1068.125	What happens if I violate the regulations? .....	70
Subpart C – Exemptions and Exclusions .....		70
§ 1068.201	Does ARB exempt or exclude any engines from the prohibited acts? .....	71
§ 1068.210	What are the provisions for exempting test engines? .....	71
§ 1068.215	What are the provisions for exempting manufacturer-owned engines? .....	71

§ 1068.220	What are the provisions for exempting display engines? .....	71
§ 1068.225	What are the provisions for exempting engines for national security? .....	72
§ 1068.230	What are the provisions for exempting engines for export? .....	72
§ 1068.235	What are the provisions for exempting engines used solely for competition? .....	72
§ 1068.240	What are the provisions for exempting new replacement engines? ..	72
§ 1068.245	What temporary provisions address hardship due to unusual circumstances? .....	73
§ 1068.250	What are the provisions for extending compliance deadlines for small-volume manufacturers under hardship? .....	73
§ 1068.255	What are the provisions for exempting engines for hardship for equipment manufacturers and secondary engine manufacturers? ..	73
§ 1068.260	What are the provisions for temporarily exempting engines for delegated final assembly? .....	74
§ 1068.265	What provisions apply to engines that are conditionally exempted from certification? .....	74
Subpart D – Imports .....		74
§ 1068.301	Does this subpart apply to me? .....	74
§ 1068.305	How do I get an exemption or exclusion for imported engines? .....	74
§ 1068.310	What are the exclusions for imported engines? .....	75
§ 1068.315	What are the permanent exemptions for imported engines? .....	75
§ 1068.320	How must I label an imported engine with a permanent exemption? ..	75
§ 1068.325	What are the temporary exemptions for imported engines? .....	75
§ 1068.330	How do I import engines requiring further assembly? .....	75
§ 1068.335	What are the penalties for violations? .....	76
Subpart E – Selective Enforcement Auditing .....		76
§ 1068.401	What is a selective enforcement audit? .....	76
§ 1068.405	What is in a test order? .....	76
§ 1068.410	How must I select and prepare my engines? .....	76
§ 1068.415	How do I test my engines? .....	76
§ 1068.420	How do I know when my engine family fails an SEA? .....	76
§ 1068.425	What happens if one of my production-line engines exceeds the emission standards? .....	77
§ 1068.430	What happens if an engine family fails an SEA? .....	77
§ 1068.435	May I sell engines from an engine family with a suspended Executive Order? .....	77
§ 1068.440	How do I ask ARB to reinstate my suspended Executive Order? ....	77
§ 1068.445	When may ARB revoke my Executive Order under this subpart and how may I sell these engines again? .....	77
§ 1068.450	What records must I send to ARB? .....	77
§ 1068.455	What records must I keep? .....	77

Appendix A to Subpart E of Part 1068-Plans for Selective Enforcement Auditing..	78
Subpart F – Reporting Defects and Recalling Engines .....	78
§ 1068.501 How do I report engine defects? .....	78
§ 1068.505 How does the recall program work? .....	78
§ 1068.510 How do I prepare and apply my remedial plan?.....	78
§ 1068.515 How do I mark or label repaired engines? .....	78
§ 1068.520 How do I notify affected owners? .....	79
§ 1068.525 What records must I send to ARB?.....	79
§ 1068.530 What records must I keep? .....	79
§ 1068.535 How can I do a voluntary recall for emission-related problems? .....	79
§ 1068.540 [Removed] .....	79
Subpart G – Hearings.....	80
§ 1068.601 What are the procedures for hearings? .....	80
Appendix I to Part 1068 – Emission-Related Components.....	80
Appendix II to Part 1068 – Emission-Related Parameters and Specifications .....	80

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR  
NEW 2008 AND LATER TIER 4 OFF-ROAD COMPRESSION-IGNITION ENGINES

SOURCE: The “California Exhaust Emission Standards and Test Procedures for New 2008 and Later Tier 4 Off-Road Compression-Ignition Engines, Part I-C” (Part I-C), adopted October 20, 2005

PART 1039 – CONTROL OF EMISSIONS FROM NEW AND IN-USE ~~NONROAD~~  
OFF-ROAD COMPRESSION-IGNITION ENGINES

Subpart A – Overview and Applicability

§ 1039.1 Does this part apply for my engines?

\* \* \* \* \*

§ 1039.625 What requirements apply under the program for equipment-manufacturer flexibility?

\* \* \* \* \*

(e)(3) In all other cases, engines at or above ~~3756~~ kW and at or below 560 kW must meet the appropriate Tier 3 standards described in Title 13, CCR, §2423(b)(1)(a). Engines below ~~3756~~ kW and engines above 560 kW must meet the appropriate Tier 2 standards described in Title 13, CCR, § 2423(b)(1)(a).

\* \* \* \* \*

PART 1065 – ENGINE-TESTING PROCEDURES

Subpart A – Applicability and General Provisions

§ 1065.1 Applicability.

\* \* \* \* \*



PART 1068 – GENERAL COMPLIANCE PROVISIONS FOR ~~NONROAD~~ OFF-ROAD PROGRAMS

Subpart A – Applicability and Miscellaneous Provisions

§ 1068.1 Does this part apply to me?

\* \* \* \* \*

Subpart B – Prohibited Actions and Related Requirements

§ 1068.101 What general actions does this regulation prohibit?

\* \* \* \* \*

(b)(3) Stationary engines. An engine that is excluded from any requirements of this chapter because it is a stationary engine may not be moved or installed in any mobile equipment except as allowed by the provisions of this chapter. The residence time requirements of paragraph (2)(iii) of the ~~nonroad~~ engine definition in §1068.30 may not be intentionally circumvented. 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 for each day you are in violation.

\* \* \* \* \*