

## Final Regulation Order

NOTE: This document is printed in a style to indicate changes from the original regulation. All original language is indicated by plain type. The amendments are shown in underline to indicate additions to the original language and ~~strikeout~~ to indicate deletions. The symbol “\*\*\*\*\*” means that the remainder of the text of the regulation for a specific section is not shown, but has been incorporated by reference, unchanged.

Amend Title 13, California Code of Regulations, sections 2702, 2703, 2704, 2706, 2707, and 2709 to read as follows:

### Chapter 14. Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines

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#### § 2702. Application Process

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- (f) Within 60 days after an application has been deemed complete, the Executive Officer shall determine whether the diesel emission control strategy merits verification and shall classify it as shown in Table 1:

Table 1. Verification Classifications for Diesel Emission Control Strategies

Pollutant	Reduction	Classification
PM	< 25%	Not verified
	≥ 25%	Level 1
		<u>Level 1 Plus*</u>
	≥ 50%	Level 2
		<u>Level 2 Plus*</u>
	≥ 85%, or ≤ 0.01 g/bhp-hr	Level 3
		<u>Level 3 Plus*</u>
NOx	< 15%	Not verified
	≥ 15%	Verified in 5% increments

\*The diesel emission control strategy complies with the 20 percent NO<sub>2</sub> limit before January 1, 2009 (and after January 1, 2007).

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(g) Extensions of an Existing Verification. If the applicant has verified a diesel emission control strategy with one emission control group and wishes to extend the verification to include additional emission control groups, it may apply to do so using the original test data, additional test data, engineering justification and analysis, ~~and~~ or any other information deemed necessary by the Executive Officer to address the differences between the emission control group already verified and the additional emission control group(s). Processing time periods follow sections (e) and (f) above.

(h) Design Modifications. If an applicant modifies the design of a diesel emission control strategy that has already been verified or is under consideration for verification by the Executive Officer, the modified version must be evaluated under this Procedure. The applicant must provide a detailed description of the design modification along with an explanation of how the modification will change the operation and performance of the diesel emission control strategy. To support its claims, the applicant must submit additional test data, engineering justification and analysis, ~~and~~ or any other information deemed necessary by the Executive Officer to address the differences between the modified and original designs. Processing time periods follow sections (e) and (f) above.

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NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018, 43105, 43600 and 43700, Health and Safety Code. Reference: Sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107 and 43204-43205.5 Health and Safety Code; Title 17 California Code of Regulations Section 93000.

### **§ 2703. Emission Testing Requirements.**

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(b) Test Engine Requirements and Pre-conditioning. The applicant may tune-up or rebuild test engines prior to, but not after, baseline testing unless rebuilding the engine is an integral part of the diesel emission control strategy. All testing should be performed with the test engine in a proper state of maintenance. Emissions of NO<sub>2</sub> from the test engine must not exceed 15 percent of the total baseline NO<sub>x</sub> emissions by mass. If there is a special category of engines with NO<sub>2</sub> emission levels that normally exceed 15 percent, this requirement may be adjusted for those engines at the discretion of the Executive Officer.

- (c) Diesel Emission Control System Pre-conditioning. The engine or vehicle installed with a diesel emission control system must be operated for a break-in period of between 25 and 125 hours before emission testing. Note that special pre-conditioning requirements may apply. See section 2706(a)(4) for details.

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NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018, 43105, 43600 and 43700, Health and Safety Code. Reference: Sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107 and 43204-43205.5 Health and Safety Code; Title 17 California Code of Regulations Section 93000.

## **§ 2704. Durability Testing Requirements**

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- (b) Engine Selection. Subject to the approval of the Executive Officer, the applicant may choose the engine and application to be used in the durability demonstration. The engine and application must be representative of the emission control group for which verification is sought. The selected engine need not be the same as the engine used for emission testing, but if the applicant does use the same engine, the emission testing may also be used for the initial durability tests. Emissions of NO<sub>2</sub> from the emissions test engine must not exceed 15 percent of the total baseline NOx emissions by mass. If there is a special category of engines with NO<sub>2</sub> emission levels that normally exceed 15 percent, this requirement may be adjusted for those engines at the discretion of the Executive Officer.

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- (g) Test Run. The requirements for emissions reduction testing are summarized in Table 4, below. Note that special pre-conditioning requirements may apply. See section 2706(a)(4) for details.

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NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018, 43105, 43600 and 43700, Health and Safety Code. Reference: Sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107 and 43204-43205.5 Health and Safety Code; Title 17 California Code of Regulations Section 93000.

## § 2706. Other Requirements.

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### (a) Limit and Procedure for Measuring Nitrogen Dioxide (NO<sub>2</sub>).

- (1) In order for a diesel emission control strategy to be verified, effective January 1, 2007, the diesel emission control strategy must not increase emissions of NO<sub>2</sub> by more than an increment equivalent in mass to 30 percent of the baseline NOx emission level. Effective January 1, 2009, the increment is reduced to 20 percent of the baseline NOx emission level. The average of NO<sub>2</sub> emission levels from both the initial and final emissions tests described in Section 2704(g) is used to determine compliance with the NO<sub>2</sub> limit. For chassis dynamometer testing, only the NO<sub>2</sub> emission level over the UDDS cycle is used. The post-control NO<sub>2</sub> emissions must not exceed 20 percent of the total baseline (pre-control) NOx emissions on a mass basis, from the same test cycle(s) for emission testing from section 2703 (e). ~~This~~ The first NO<sub>2</sub> emission limit takes effect beginning on January 1, 2007. Diesel emission control strategies verified and installed prior to January 1, 2007 are exempted from this requirement. Those verified prior to January 1, 2007 will no longer be allowed for installation after January 1, 2007 unless they meet the appropriate NO<sub>2</sub> emission limit. After January 1, 2007, all diesel emission control strategies verified and installed must meet this requirement.
- (2) NO<sub>2</sub> emissions are to be quantified by one of the following methods:
  - (A) Two chemiluminescence analyzers,
  - (B) A dual-path chemiluminescence analyzer, or
  - (C) An alternative method approved by the Executive Officer.
- (3) Analyzer configuration and determination of NO<sub>2</sub> emission level. For (2)(A) and (2)(B), the analyzers are to be fed from a heated and conditioned sample path. If two chemiluminescence analyzers are employed, they are to be simultaneously fed from a common heated sample path. One instrument (or path) shall be set to NOx mode, while the second shall be set to nitric oxide (NO) mode. The instrument (or path) set to NOx mode receives a sample that has passed through an NO<sub>2</sub>-to-NO converter, and the resultant concentration is designated as total NOx (NO+NO<sub>2</sub>) in the sample. The instrument (or path) that is set to NO mode receives a sample that has not passed through the converter and quantifies the amount of NO only. The difference between NO and NOx is the amount of NO<sub>2</sub> in the sample. Both NO and NOx signals are recorded by an external data acquisition system at 1 Hertz. Using the average concentrations of NO and NOx over the entire test cycle, the conventional equation for calculating total NOx (Code of Federal Regulations, Title 40, part 86, Subpart N) is then used to generate a gram per mile or g/bhp-hr value for both NO and NOx. The resulting value for NO is then subtracted from that for NOx to determine the gram per mile or g/bhp-hr value for NO<sub>2</sub>. The instrument for measuring NO and NOx must

be calibrated in accordance with the NO<sub>x</sub> calibration procedure as described in the Code of Federal Regulations, Title 40, part 86, Subpart N.

- (4) Pre-conditioning requirements. If the Executive Officer determines that NO<sub>2</sub> emissions from a diesel emission control system could be affected by the presence of particulate matter or ash (as with a catalyzed diesel particulate filter), the system must be preconditioned according to the following procedure:

(A) Initial test (prior to service accumulation). Before conducting the initial emissions test, the unit being tested must be pre-conditioned as follows:

1. Install the unit on an engine that is an appropriate size for the unit, in a good state of maintenance, and certified to a PM standard equal to or more stringent than that of the engines in the emission control group for which the applicant seeks verification.
2. Operate the engine on one of the test cycles specified below for 25 to 30 hours. For on-road verifications, use either the FTP (hot-start) or UDDS cycle as identified in 2703(e), or the 13-mode Supplemental Emissions Test (SET) in the Code of Federal Regulations, Title 40, Part 86. For off-road and stationary verifications, use either the steady-state test cycle from ARB off-road regulations or the Nonroad Transient Cycle (NRTC) in the Code of Federal Regulations, Title 40, Part 1039. For up to 10 hours of the 25 to 30 hour period, an applicant may alternatively:
  - a. Run the engine at high load such that the exhaust temperature is between 350 and 450 degrees Celsius, or
  - b. Alternate back and forth between high and low loads such that the exhaust temperature never exceeds 525 degrees Celsius and the low load operation does not result in significant soot accumulation at the end of the pre-conditioning period.
3. Measure and record the backpressure on a second-by-second basis (1 Hertz) for at least the first three of the repeated test cycles (when the unit is brand new) and the last three (which follow the optional high load operation of up to 10 hours). Determine the average backpressure for each run.
4. Following the 25 to 30 hour period of operation, run three test repetitions (hot-start) of the emissions test cycle with the unit installed on the emissions test engine. If using a chassis dynamometer, run the UDDS. For each run, measure and record the backpressure on a second-by-second basis (1 Hertz) and determine the average. Proceed with the emissions test.

(B) Final test (after the service accumulation). Before conducting the final emissions test, the aged unit may need to be pre-conditioned. Run three repetitions (hot-start) of the emissions test cycle with the unit installed on the emissions test engine. If using a chassis dynamometer, run the UDDS. For each run, measure and record the backpressure on a second-by-second basis (1 Hertz) and determine

the average. Proceed with the emissions test if the average backpressure is within 30 percent of the average backpressure recorded for the initial test unit. If the backpressure is too high, burn off excess soot or clean out excess ash as necessary. Run an additional repetition of the emissions test cycle (hot-start) to check if the unit complies with the backpressure criterion. Repeat as necessary.

(C) In-use compliance testing. Before conducting the first phase of in-use compliance emissions testing, the test units may need to be pre-conditioned. Using the required test cycle, measure and record the backpressure on a second-by-second basis (1 Hertz) of a cleaned (or pre-conditioned per subsection (A) above) reference unit installed on the engine to be used for in-use compliance testing. The reference unit must be identical to the test units. Measure and record the backpressure of the test units retrieved from the field using the same engine and test cycle as used with the reference unit. If the backpressure of the test units is within 30 percent of the average backpressure recorded for the reference unit, they do not require pre-conditioning. Otherwise, the test units must be pre-conditioned following subsection (B) above. Other units may not be substituted for the selected test units.

(5) Determination of compliance with the NO<sub>2</sub> limit. Compliance with the NO<sub>2</sub> limit is based on the average incremental increase in NO<sub>2</sub> emissions as determined by the following equation:

$$\text{Percent Increase} = 100\% \times 0.5 \times [(\text{NO}_2^i - \text{NO}_2^b) + (\text{NO}_2^f - \text{NO}_2^b)] / \text{NOx}^b$$

Where “NO<sub>2</sub>” and “NOx” stand for the mass-based emission rates of NO<sub>2</sub> and NOx, respectively, as determined in subsection (a)(3) above, and the superscripts “i”, “f”, and “b” stand for “initial test”, “final test”, and “baseline test”, respectively. For in-use compliance testing, the equation is:

$$\text{Percent Increase} = 100\% \times (\text{NO}_2^c - \text{NO}_2^b) / \text{NOx}^b$$

Where the superscript “c” stands for the in-use compliance emissions testing conducted with the unit installed on the test engine.

(4)(6) Alternative Method to Measure NO<sub>2</sub>. The applicant may request the Executive Officer to approve an alternative method in place of the required methods. In reviewing this request, the Executive Officer may consider all relevant information including, but not limited to, the following:

- (A) Correlation of the alternative method with the methods stated in 2(A) or 2(B).
- (B) Body of existing data generated using the alternative method.

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(g) System Labeling.

- (1) The applicant must ensure that a legible and durable label is affixed on both the diesel emission control system and the engine on which the diesel emission control system is installed except as noted in (3) below. The required labels must identify the name, address, and phone number of the manufacturer, the diesel emission control strategy family name (defined in (2) below), a unique serial number, and the month and year of manufacture. The month and year of manufacture are not required on the label if this information can be readily obtained from the applicant by reference to the serial number. A scale drawing of a sample label must be submitted with the verification application. Unless an alternative is approved by the Executive Officer, the label information must be in the following format:

**Name, Address, and Phone Number of Manufacturer**

**Diesel Emission Control Strategy Family Name**

**Product Serial Number**

**ZZ-ZZ** (Month and Year of manufacture, e.g., 06-02)

- (2) Diesel Emission Control Strategy Family Name. Each diesel emission control strategy shall be assigned a family name defined as below:

**CA/MMM/YYYY/PM#/N##/APP/XXXXX**

CA: Designates a diesel emission control strategy verified in California

MMM: Manufacturer code (assigned by the Executive Officer)

YYYY: Year of verification

PM#: PM verification level 1, 1+, 2, 2+, ~~or~~ 3, or 3+ (e.g., PM3 means a level 3 PM emission control system).

N##: NOx verified reduction level in percent, if any (e.g., N25 means NOx reduction of 25 percent).

APP: Verified application which may include a combination of On-road (ON), Off-road (OF), or Stationary (ST)

XXXXX: Five alphanumeric character code issued by the Executive Officer

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(l) Verification of a diesel emission control strategy by the Air Resources Board does not release the applicant from complying with all other applicable legal requirements.

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NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018, 43105, 43600, 43700 and 43830.8, Health and Safety Code. Reference: Sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107 and 43204-43205.5 Health and Safety Code; Title 17 California Code of Regulations Section 93000.

## **§ 2707. Warranty Requirements.**

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- (c) Diesel Emission Control Strategy Warranty Report. The applicant must submit a warranty report to the Executive Officer by ~~February~~ April 1 of each calendar year. The applicant must also submit a warranty report within 30 calendar days if warranty claims exceed four percent of the number of diesel engines using the diesel emission control strategy. The warranty report must include the following information:

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NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018, 43105, 43600 and 43700, Health and Safety Code. Reference: Sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107 and 43204-43205.5 Health and Safety Code; Title 17 California Code of Regulations Section 93000.

## **§ 2709. In-Use Compliance Requirements**

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- (d) Number of Diesel Emission Control Systems to be Tested. The number of diesel emission control systems an applicant must test in each of the two test phases will be determined as follows:
- (1) A minimum of four diesel emission control systems in each diesel emission control strategy family must be tested. For every system tested that does not reduce emissions by at least 90 percent of the lower bound of its initial verification level (or does not achieve an emission level less than or equal to 0.011 g/bhp-hr of PM) or does not meet the NO<sub>2</sub> requirement in section 2709(j), two more diesel emission control systems from the same family must be obtained and tested. The total number of systems tested shall not exceed ten per diesel emission control strategy family.
  - (2) At the discretion of the Executive Officer, applicants may begin by testing more than the minimum of four diesel emission control systems. Applicants



may concede failure of an emission control system before testing a total of ten diesel emission control systems.

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- (e) In-use Compliance Emission Testing. Applicants must follow the testing procedure used for emission reduction verification as described in Section 2703 (both baseline and control tests are required), and special pre-conditioning requirements may apply (see section 2706(a)(4) for details). In addition, applicants must select the same test cycle(s) that they used to verify the diesel emission control strategy originally. If a diesel emission control strategy verified by U.S. EPA must perform engine dynamometer testing with the Heavy-duty Transient FTP cycle to fulfill the in-use compliance requirements of that program, but was verified by the Executive Officer with chassis dynamometer testing, the Executive Officer will also accept testing with the Heavy-duty Transient FTP cycle for the in-use compliance requirements of this Procedure. If a diesel emission control strategy fails catastrophically during the in-use compliance testing, the applicant must provide an investigative report detailing the causes of the failure to the Executive Officer within 90 days of the failure.

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- (j) Conditions for Passing In-Use Compliance Testing. For a diesel emission control strategy to pass in-use compliance testing, emission test results must indicate that the strategy reduced emissions by at least 90 percent of the lower bound of the emission reduction level the Executive Officer originally verified it to. In addition, the strategy must meet the requirements of section 2706(a) with the exception that the strategy must not increase emissions of NO<sub>2</sub> by more than an increment equivalent in mass to 33 or 22 percent of the baseline NO<sub>x</sub> emission level for systems verified under the 30 or 20 percent NO<sub>2</sub> limits, respectively. If the first four diesel emission control systems tested within a diesel emission control strategy family meet ~~this standard~~ both of these standards, the diesel emission control strategy passes in-use compliance testing. If any of the first four diesel emission control systems tested within a diesel emission control strategy family fail to meet either of these standards ~~reduce emissions by at least 90 percent of the lower bound of the emission reduction level the Executive Officer originally verified it to,~~ and more than four units are tested, at least 70 percent of all units tested must ~~pass the 90 percent standard~~ meet both standards for the diesel emission control strategy family to pass in-use compliance testing. For each failed test, for which the cause of failure can be attributed to the product and not to maintenance or other engine-related problems, two additional units must be tested, up to a total of ten units per diesel emission control strategy family.

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NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018, 43105, 43600 and 43700, Health and Safety Code. Reference: Sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107 and 43204-43205.5 Health and Safety Code; Title 17 California Code of Regulations Section 93000.