State of California
AIR RESOURCES BOARD

CALIFORNIA REFUELING EMISSION STANDARDS AND TEST PROCEDURES FOR 2001 AND SUBSEQUENT MODEL MOTOR VEHICLES

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Amended: September 2, 2015
Amended: [INSERT DATE OF AMENDMENT]

Note: ACC II Draft CARB staff proposed changes for public discussion, December 2021, Subject to change before issuance of Notice of Proposed Rulemaking.
The proposed amendments to this document are shown in underline to indicate additions and ~~strikeout~~ to indicate deletions compared to the test procedures as adopted September 2, 2015. [No change] indicates proposed federal provisions that are also proposed for incorporation herein without change. Existing intervening text that is not amended in this rulemaking is indicated by "* * * *".

NOTE: This document is incorporated by reference in section 1978(b), title 13, California Code of Regulations (CCR). Additional requirements necessary to complete an application for certification of motor vehicles are contained in other documents that are designed to be used in conjunction with this document. These other documents include:

1. “California 2001 through 2014 Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2009 through 2016 Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles” (incorporated by reference in section 1961(d), title 13, CCR).

2. “California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles” (incorporated by reference in section 1961.2 (d), title 13, CCR).

3. “California Exhaust Emission Standards and Test Procedures for 2009 through 2017 Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes” (incorporated by reference in section 1962.1(h), title 13, CCR).

4. "California Exhaust Emission Standards and Test Procedures for 2018 and Subsequent Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," (incorporated by reference in section 1962.2(h), title 13, CCR).

5. “California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles” (incorporated by reference in section 1976(c), title 13, CCR).

6. “Malfunction and Diagnostic System Requirements for 1994 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines” (incorporated by reference in section 1968.1, title 13, CCR).

7. “Malfunction and Diagnostic System Requirements for 2004 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines” (incorporated by reference in section 1968.2, title 13, CCR).

8. “Specifications for Fill Pipes and Openings of Motor Vehicle Fuel Tanks” (incorporated by reference in section 2235, title 13, CCR).

CALIFORNIA REFUELING EMISSION STANDARDS AND TEST PROCEDURES FOR 2001 AND SUBSEQUENT MODEL MOTOR VEHICLES

The provisions of Title 40, Code of Federal Regulations (CFR), Part 86, Subparts B (as adopted or amended by the U.S. Environmental Protection Agency (U.S. EPA) on the date listed) and S (as adopted on May 4, 1999, or as last amended on such other date set forth next to the 40 CFR Part 86 section title listed below) to the extent they pertain to the testing and compliance of vehicle refueling emissions for passenger cars, light-duty trucks and medium-duty vehicles, are hereby adopted as the "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," with the following exceptions and additions.

Subpart S Requirements

I. General Certification Requirements for Refueling Emissions

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Subpart B - Emission Regulations for 1977 and Later Model Year New Light-Duty Vehicles and New Light-Duty Trucks; Test Procedures

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II. Refueling Emissions Test Procedures

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4. §86.153-98 Vehicle and canister preconditioning; refueling test (April 28, 2014)

4.1. Amend subparagraph (a) to include: The vehicle preconditioning drive for 2012 and later model-year off-vehicle charge capable hybrid electric vehicles shall include at least one complete UDDS performed entirely under a charge-sustaining mode of operation~~,~~. The battery state-of-charge net change tolerance provisions specified in section G.10., of the "California Exhaust Emission Standards and Test Procedures for 2009 through 2017 Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes" and the "California Exhaust Emission Standards and Test Procedures for 2018 and Subsequent Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes" shall not apply.

4.1.1. Add subparagraph (a)(1): 2012 and subsequent model-year off-vehicle charge capable hybrid electric vehicles equipped with non-integrated refueling canister-only systems. Such vehicles and vapor storage canisters shall be preconditioned in accordance with the preconditioning procedures for the two-

diurnal evaporative emissions test specified in 40 CFR 86.132-96(a) through (j) (April 28, 2014), with the following exceptions.

4.1.1.1~~2.~~ Prior to conducting the applicable test sequence, the nonintegrated refueling canister shall have already achieved a stabilized state, such as is accomplished using the stabilization method described in section III.D.3.3.4, of the "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles." Within 60 minutes of completing the vehicle preconditioning drive, a second fuel drain and fill step shall be performed~~,~~. The fuel tank shall be filled to the prescribed tank fuel volume of 95 percent of the manufacturer's nominal fuel tank capacity, determined to the nearest one-tenth of a U.S. gallon (0.38 liter) with the specified fuel.

4.1.1.2~~3.~~ After the second fuel drain and tank refill step is completed, the initial testing state of the canister shall be established by purging while performing vehicle driving, using either the chassis dynamometer procedure or the test track procedure, as described in subparagraphs (d)(1) and (d)(2) of 40 CFR 86.153-98 (April 28, 2014). For vehicles equipped with dual fuel tanks that can be individually selected or isolated, the required volume of fuel shall be driven out of one tank, the second tank shall be selected as the fuel source, and the required volume of fuel shall be driven out of the second tank. A manufacturer shall plan for interruptions in the vehicle drivedowns due to factors such as work schedules, driver relief, and test equipment considerations, using good engineering practice.

4.1.1.2~~3~~.1. The vehicle drivedown will consume 85%, or less as determined by the manufacturer, of the manufacturers' nominal fuel tank capacity.

4.1.1.2~~3~~.2. In order to reduce the amount of time required to consume 85 percent of the fuel tank capacity, as required by either subparagraph (d)(1) or (d)(2) in 40 CFR 86.153-98 (April 28, 2014), as applicable, a manufacturer may elect to set the battery state- of- charge at a level that maximizes the amount of engine operation, prior to conducting either the chassis dynamometer or the test track driving procedure, as applicable.

4.1.1.2~~3~~.3. With advance Executive Officer approval, a manufacturer may optionally elect to bench purge the canister either during the initial soak period, specified in 40 CFR §86.132-96(c)(1) (April 28, 2014), or after the vehicle preconditioning drive step specified in section II.B.4.1., in lieu of performing the second fuel drain/fill and vehicle drivedown steps specified in sections II.B.4.1.1.2. and II.B.4.1.1.3. Approval by the Executive Officer shall be based upon assurance that the canister will be bench purged by an equivalent volume of air corresponding to a consumption of 85%, or less as determined by the manufacturer, of the manufacturers' nominal fuel tank capacity, and that the characteristics of the purge flow through the canister, such as flow rates, shall be representative of flow that occurs under the specified

vehicle drivedown UDDS cycles. Within 60 minutes of completing the bench purging, the fuel drain and fill step specified in section II.B.4.1.1.4., shall be performed.

4.1.1.3~~4~~. Within 60 minutes of completing the vehicle drivedown, a third fuel drain and fill step shall be performed in which the fuel tank shall be filled to a prescribed tank fuel volume of 10 percent of the manufacturer's nominal fuel tank capacity, determined to the nearest one-tenth of a U.S. gallon (0.38 liter) with the specified fuel. The manufacturer may isolate the canister using any method that does not compromise the integrity of the system. A description of the canister isolation method shall be included in the manufacturer's certification application. When the refueling canister is isolated from its system, fuel vapors shall be allowed to be vented from the fuel tank, as appropriate, during this fill step.

4.1.1.4~~5~~. In lieu of performing the third fuel drain and fill step specified in section II.B.4.1.4., the required fuel tank volume of 10 percent may be established by using a measured drain of the fuel tank, within 60 minutes of completing the vehicle drivedown.

4.1.1.5~~6~~. Fuel-tank-refill canister loading. Good engineering practice and safety considerations, such as, but not limited to, adequate ventilation and appropriate electrical groundings, shall apply.

4.1.1.6~~7~~. The test vehicle shall be allowed to soak for a minimum of 6 hours and a maximum of 24 hours, at 80ºF ±3ºF (27ºC ±1.7ºC), prior to starting the fuel-tank-fill canister-loading step.

4.1.1.6~~7~~.1. Off-vehicle charging to increase the battery state-of-charge to the highest level allowed by the manufacturer, prior to either the chassis dynamometer or the test track driving procedures specified in section II.B.4.4., shall occur during the soak period specified in section II.B.4.1.1.7.

4.1.1.7~~8~~. The refueling canister shall not be isolated from its system during the fuel-tank-refill canister-loading step.

4.1.1.8~~9~~. The test vehicle's fuel fill pipe cap shall be removed

4.1.1.9~~10~~. The dispensed fuel temperature recording system shall be started.

4.1.1.10~~11~~. The fuel nozzle shall be inserted into the fill pipe neck of the test vehicle, to its maximum penetration, and the tank refueling operation shall start. The plane of the nozzle's handle shall be approximately perpendicular to the floor. The fuel shall be dispensed at a temperature of 67ºF ±3.0ºF (19.4ºC ±1.7ºC), and at a dispensing rate of 9.8 gal/min ±0.3 gal/min (37.1 liter/min ±1.1 liter/min). If using California certification fuel, the fuel shall be dispensed at a temperature of 79±1.5 ºF (26.1±0.8 ºC) and at a dispensing rate of 9.8±0.3 gal/min (37.1±1.1 liter/min). When this refueling operation is conducted by the Executive Officer, a dispensing rate that is not less than 4.0 gal/min (15.1 liter/min) may be used.

4.1.1.11~~12~~. The fuel flow shall continue until the refueling nozzle automatic shut-off is activated. The amount of fuel dispensed must be at least

85 percent of the nominal fuel tank volume, determined to the nearest one-tenth of a U.S. gallon (0.38 liter). If an automatic nozzle shut-off occurs prior to this point, the dispensing shall be reactivated within 15 seconds, and fuel dispensing continued as needed. A minimum of 3 seconds shall elapse between any automatic nozzle shutoff and the subsequent resumption of fuel dispensing.

4.1.1.12~~13~~. As soon as possible after completing the refilling step, remove the fuel nozzle from the fill pipe neck, and replace the test vehicle's fuel fill pipe cap.

4.1.1.13~~14~~. It is optional for the manufacturer to isolate the refueling canister ~~The refueling canister shall be isolated from its system as soon as possible~~ after completing the refilling step. During certification, the manufacturer shall report whether the canister was isolated or not, and the same method shall be used for compliance testing.

4.1.1.14~~15~~. For vehicles equipped with more than one fuel tank, the steps described in this section shall be performed for each fuel tank.

4.1.1.15~~16~~. When the fuel-tank-refill canister-loading operation is completed, the test vehicle shall proceed to the non-integrated system canister purging procedures specified in section II.B.4.4. The canister shall not be isolated from its system during these canister-purging procedures.

4.1.1.16~~17~~. The Executive Officer may approve minor modifications to this canister-loading method when such modifications are supported by good engineering judgment, and do not reduce the stringency of the method.

4.2. Subparagraph (b) [No change.]

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4.4.8. In lieu of performing the vehicle drivedown step specified in section II.B.4.4., a manufacturer may, with advance Executive Officer approval, optionally elect to bench purge the canister. Approval by the Executive Officer shall be based upon assurance that the canister will be bench purged by an equivalent volume of air corresponding to a consumption of 85%, or less as determined by the manufacturer, of the manufacturers' nominal fuel tank capacity, and that the characteristics of the purge flow through the canister, such as flow rates, shall be representative of flow that occurs under the specified vehicle drivedown UDDS cycles.

4.4.9. It is optional for the manufacturer to isolate the refueling canister ~~The canister shall be isolated~~ from its system after completing the canister-purging procedures. During certification, the manufacturer shall report whether the canister was isolated or not, and the same method shall be used for compliance testing.

4.4.10. When the optional canister bench purge specified in section II.B.4.4.8. is elected, the 10-percent fuel tank volume specified in 40 CFR 86.153-98(e) (April 28, 2014), may be established by using a measured drain of the fuel tank, within 60 minutes of completing the canister bench purge.

4.5. Subparagraph (e) [No change.]

6. §86.155-98 Records required; refueling test (April 6, 1994) [No change].

7. Amend §86.156-98 Calculations (April 6, 1994) as follows:

7.1 ~~Amend subparagraph (a) to include: Ethanol in the emissions shall be accounted for via measurement as indicated in §86.143-96, or mass adjustment factor using the method described in section III.D.11 of the "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," for vehicles tested with California E10, Federal E10, or the test fuel specified in 40 CFR §86.1810-17(h)(2).~~ Subparagraph (a) [No change.]

7.2 Subparagraph (b) [No change.]

7.3 Subparagraph (c) [No change.]

III. Figures illustrating the refueling test procedures

The figures in this section III are for illustrative purposes only. If any discrepancies exist between the language in section II and the figures in this section III, the requirements in section II shall apply.

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Figure 1: Test Sequence for Conventional Vehicles:

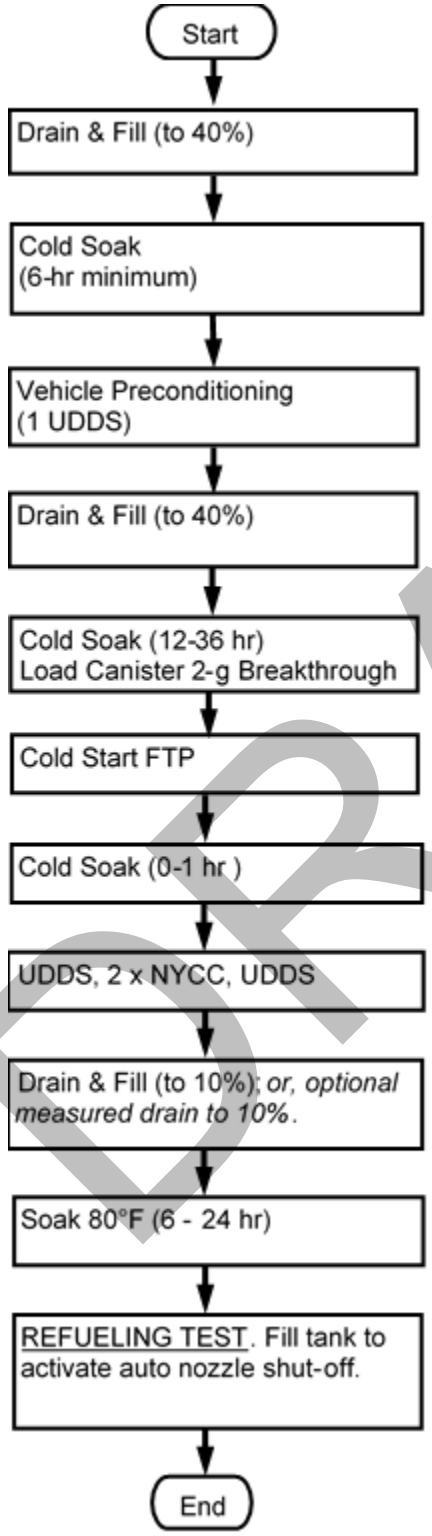

Figure 2: Test Sequence for Off-Vehicle Charge Capable Vehicles with Non-Integrated-Refueling Canister Only System: