Appendix B – 4

California Environmental Protection Agency

AIR RESOURCES BOARD

CALIFORNIA EVAPORATIVE EMISSION STANDARDS AND TEST PROCEDURES FOR 2026 AND SUBSEQUENT MODEL YEAR PASSENGER CARS, LIGHT-DUTY TRUCKS, MEDIUM-DUTY VEHICLES, AND HEAVY-DUTY VEHICLES

Adopted: [Insert Adoption Date]

Date of Release: April 12, 2022
Date of Hearing: June 9, 2022

NOTE: This document is incorporated by reference in section 1976(c), 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 2026 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles” (incorporated by reference in section 1961.4 (d), title 13, CCR);

2. “California Test Procedures for 2026 and Subsequent Model Zero-Emission Vehicles and Plug-in Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes” (incorporated by reference in section 1962.4, title 13, CCR);

3. “California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles” (incorporated by reference in section 1978(b), title 13, CCR);

4. "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines," as incorporated by reference in section 1956.8(d), title 13, CCR.

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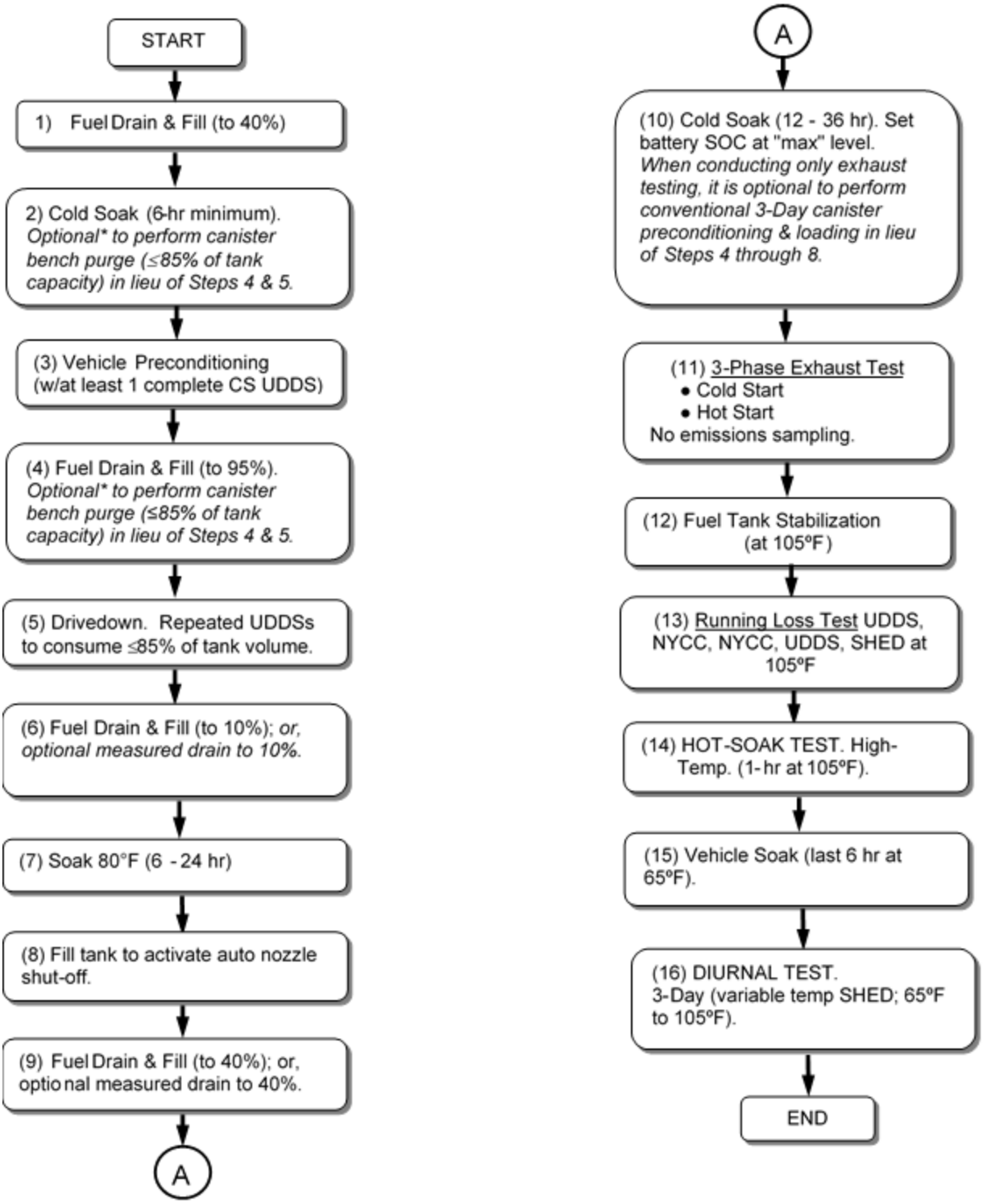

Figure 4: 3-day Test Procedure for Off-vehicle Charge Capable Hybrid Electric Vehicles with Non-Integrated Refueling Canister-Only System

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CALIFORNIA EVAPORATIVE EMISSION STANDARDS AND TEST PROCEDURES TEST PROCEDURES FOR 2026 AND SUBSEQUENT MODEL YEAR PASSENGER CARS, LIGHT-DUTY TRUCKS, MEDIUM-DUTY VEHICLES, AND HEAVY-DUTY VEHICLES

The provisions of Title 40, Code of Federal Regulations (CFR), Part 86, Subparts A, B, and S (as adopted or amended on May 4, 1999); and, such sections of these Subparts as last amended on such other date set forth next to the 40 CFR Part 86 section title listed below, insofar as those subparts pertain to evaporative emission standards and test procedures, are hereby adopted as the "California Evaporative Emission Standards and Test Procedures for 2026 and Subsequent Model Year Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles, and Heavy-Duty Vehicles," with the following exceptions and additions:

PART I: GENERAL CERTIFICATION REQUIREMENTS FOR EVAPORATIVE EMISSIONS

A. 40 CFR §86.1801 **Applicability.**

1. §86.1801-12. October 25, 2016. Amend as follows.

1.1. These evaporative standards and test procedures are applicable to all new 2026 and subsequent model gasoline-, liquefied petroleum- and alcohol-fueled passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles, hybrid electric vehicles (including fuel-flexible, dual fuel and bi-fuel vehicles, plug-in hybrid electric vehicles). Unless otherwise indicated, these standards and test procedures do not apply to motor vehicles that are exempt from exhaust emission certification, dedicated petroleum-fueled diesel vehicles, or dedicated compressed natural gas-fueled vehicles. In cases where a provision applies only to a certain vehicle group based on its model year, vehicle class, motor fuel, engine type, or other distinguishing characteristics, the limited applicability is cited in the appropriate section.

1.2. For general certification purposes, and except as otherwise noted in these test procedures, the requirements set forth in the “California 2026 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles,” the “California Test Procedures for 2026 and Subsequent Model Zero-Emission Vehicles and Plug-in Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes,” and the “California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles,” shall apply to light- and medium-duty vehicles; and the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines,” shall apply to heavy-duty vehicles.

1.3. Approval of vehicles that are not exhaust emission tested using a chassis dynamometer pursuant to section 1961, title 13, CCR shall be based on an engineering evaluation of the system and data submitted by the applicant.

1.4. Reference to light-duty trucks in the federal CFR shall mean light-duty trucks and medium-duty vehicles. Regulations concerning methanol in the Title 40, CFR Part 86, shall mean methanol and ethanol, except as otherwise indicated in these test procedures.

1.5. The term "[no change]" means that these test procedures do not modify the applicable federal requirement.

1.6. In those instances where the testing conditions or parameters are not practical or feasible for vehicles operating on LPG fuel, the manufacturer shall provide a test plan that provides equal or greater confidence in comparison to these test procedures. The test plan must be approved in advance by the Executive Officer.

1.7. If a manufacturer opts to use 40 CFR Part 1066 per the migration schedule set forth in 40 CFR 86.101 (b), in lieu of 40 CFR Part 86, the California-specific 40 CFR Part 86 modifications contained herein shall still apply.

B. Definitions, Acronyms, Terminology

1. These test procedures incorporate by reference the definitions set forth in the "California 2026 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" and the "California Test Procedures for 2026 and Subsequent Model Zero-Emission Vehicles and Plug-in Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," including the incorporated definitions from the Code of Federal Regulations. In addition, the following definitions apply:

1.1. Non-integrated refueling canister-only system" means a subclass of a non-integrated refueling emission control system, where other non-refueling related evaporative emissions from the vehicle are stored in the fuel tank, instead of in a vapor storage unit(s).

1.2. "Sealed fuel system" means a non-liquid phase fuel system, on-board a vehicle, that stores, delivers, and meters the fuel under a very high pressure, and which inherently has no evaporative-related emissions, due to design specifications that eliminate the escape of any fuel vapors, under normal vehicle operations.

1.3. "2-gram breakthrough" means the point at which the cumulative quantity of hydrocarbons emitted from a stabilized canister vapor storage unit, during the loading process of the unit, is equal to 2 grams.

1.4. References to the "EPA" and "Administrator" shall mean the Executive Officer of the Air Resources Board.

C. Useful Life

1. §86.1805-17 (October 25, 2016). Delete. For vehicles certified to the emission standards in section I.E.1.(a), "useful life" shall have the same meaning as provided in section 2112, title 13, CCR. Except as provided below, for vehicles certified to the emission standards in sections I.E.1.(c), I.E.1.(d), and I.E.1.(e), the "useful life" shall be 15 years or 150,000 miles, whichever first occurs. For 2016 and previous model vehicles, 2017 and previous model vehicles >6,000 lbs. GVWR, and 2021 and previous model vehicles certified by a small volume manufacturer, the canister bleed standards are certification standards only.

D. General Standard Requirements

1. Light- and Medium-Duty Vehicles.

1.1. Amend §86.1810-17 (February 19, 2015) as follows:

1.1.1 Subparagraphs (a) through (g) [n/a] [The provisions of these paragraphs are contained in the “California 2026 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles.”]

1.1.2 Subparagraph (h) For alcohol vehicles, hydrocarbon evaporative emissions shall be expressed as OMHCE.

1.1.3 Subparagraph (i) [No change.]

1.1.4 Subparagraph (j) Evaporative Emissions general provisions.

(1) The evaporative standards in section E. of this part apply equally to certification and in-use vehicles and trucks.

(2) For certification testing only, a manufacturer may conduct testing to quantify a level of stabilized non-fuel evaporative emissions for an individual certification test vehicle. Testing may be conducted on a representative vehicle to determine the non-fuel evaporative emission characteristics of the certification test vehicle. The demonstration must be submitted for advance approval by the Executive Officer and include a description of the sources of vehicle non-fuel evaporative emissions, the methodology for the quantification of the non-fuel emissions, an estimated non-fuel emission decay rate, and the stabilized non-fuel emission level. The demonstrated stabilized level of non-fuel evaporative emissions may be used in place of the test vehicle non-fuel evaporative emissions and be combined with the vehicle fuel evaporative emissions to determine compliance with the evaporative emission standard.

(3) [No change.]

(4) [No change.]

1.1.5 Subparagraphs (k) through (n) [n/a] [The provisions of these paragraphs are contained in the "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Year Motor Vehicles."]

1.1.6 Subparagraphs (o) through (p) [n/a] [The provisions of these paragraphs are contained in the “California 2026 and Subsequent Model Criteria

Pollutant Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles."]

2. **Heavy-Duty Vehicles.** Approval of heavy-duty vehicles over 14,000 lbs. GVWR and incomplete medium-duty vehicles shall be based on:

2.1. §1037.103 (June 29, 2021)

2.1.1 Subparagraphs (a) and (b) [N/A]

2.1.2 Subparagraph (c) [No change.] The provisions of this paragraph also apply to incomplete medium-duty vehicles.

2.1.3 Subparagraphs (d) through (g) [No change.]

2.2. Additional requirements for engineering evaluations and data submitted by the applicant: Engineering evaluations may include successful public usage on light-duty or medium-duty vehicles, adequate capacity of storage containers, routing of lines to prevent siphoning, and other emissions-related factors deemed appropriate by the Executive Officer. For LPG systems, this engineering evaluation shall include: emissions from pressure relief valves, carburetion systems and other sources of leakage; emissions due to fuel system wear and aging, and evaporative emission test data from light-duty or medium-duty vehicles with comparable systems.

3. Auxiliary engines and fuel systems

3.1. §86.1813-17 (e) (June 29, 2021) [No change]

3.2. Except for 2017 model vehicles >6,000 lbs. GVWR and 2021 and previous model vehicles certified by a small volume manufacturer, 2017 and subsequent model vehicles equipped with an auxiliary engine shall be subject to these requirements.

3.3. For 2026 and subsequent model year motor vehicles, these requirements apply to any auxiliary fuel system, including a fuel fired heater.

3.4. These requirements also apply to motor vehicles that are exempt from exhaust emission certification, dedicated petroleum-fueled diesel vehicles, and dedicated compressed natural gas-fueled vehicles.

PART II: DURABILITY DEMONSTRATION

A. Light- and Medium-Duty Vehicles

1. Evaporative/refueling emission family determination. §86.1821-01 (April 28, 2014) [No change.]
2. Durability Demonstration Procedures for Evaporative Emissions

2.1. §86.1824-08. April 28, 2014. Amend as follows:

2.1.1 Subparagraphs (a) and (b) Delete.

2.1.2 Subparagraph (c) [No change.]

2.1.3 Subparagraph (d) Delete.

2.1.4 Subparagraph (e) Amend to read: *In-use verification and In-use confirmatory testing.* The durability program must meet the requirements of §86.1845-04 (October 25, 2016) and §86.1846-01 (October 25, 2016).

2.2. For all passenger cars, light-duty trucks and chassis-certified medium-duty vehicles subject to the standards specified in section I.E. of these test procedures, demonstration of system durability and determination of three-day diurnal plus hot soak, two-day diurnal plus hot soak, and running loss emission deterioration factors ("evaporative DFs") for each evaporative/refueling family shall be based on tests of representative vehicles and/or systems. For purposes of evaporative emission durability testing, a representative vehicle is one which, with the possible exception of the engine and drivetrain, was built at least three months prior to the commencement of evaporative emission testing, or is one which the manufacturer demonstrates has stabilized non-fuel-related evaporative emissions.

2.3. Prior to commencement of a durability program, the manufacturer shall propose a method for durability testing and for determination of evaporative DFs for each evaporative/refueling family. The 4,000 and full useful life mile test points (or their equivalent) used in determining a DF must be within the standards of section I.E. or data will not be acceptable for use in the calculation of a DF, except for the following provision. For evaporative families certified to the emission standards in section I.E.(e)(i)(B) that utilize the fleet-average option, the 4,000 and full useful life mile test points for the highest whole vehicle diurnal plus hot soak emissions may exceed the emission standards of section I.E.(e)(i)(B) but must be less than the maximum allowed family emission limits set forth in footnote (2) of the table in section I.E.(e)(i)(B). A manufacturer is not required to obtain a new approval to use a previously approved evaporative emission durability procedure. The Executive Officer shall review the method, and shall approve it if it meets the following requirements:

2.3.1 The method must cycle and test the complete evaporative emission control system for the equivalent of the applicable vehicle useful life (i.e. 150,000 miles) of typical customer use.

2.3.2 The method must reflect the flow of liquid and gaseous fuel through the evaporative emission control system, and the exposure (both peak and cyclical) to heat, vibration, and ozone expected based on typical customer use through the applicable useful life.

2.3.3 The method must have the specifications for acceptable system performance, including maximum allowable leakage based on typical customer use through the applicable vehicle useful life.

2.4. (a) In addition to the requirements of section II.A.2.3. above, for evaporative/refueling families subject to testing for exhaust emission durability, at least one evaporative emission test shall be conducted at 5,000, 40,000, 70,000, and 100,000 mile test points for all passenger car, and light-duty truck durability vehicles and at 5,000, 40,000, 70,000, 90,000, and 120,000 mile test points for all medium-duty durability vehicles. For all vehicles subject to the useful life requirement of 150,000 miles or 15 years for exhaust emissions, at least one evaporative emission test shall also be conducted at the 150,000 mile test point if the durability vehicle will be tested for exhaust emissions at the 150,000 mileage point. With prior written approval from the Executive Officer, manufacturers may terminate evaporative emissions testing at the mileage corresponding to 75 percent of the vehicle's useful life if no significant vehicle maintenance or emissions change are observed. Testing may be performed at different intervals as determined by the manufacturer using good engineering judgment. Evaporative emission testing may be performed at corresponding exhaust emission mileage points as set forth in section F.4. (40 CFR §86.1823) of the "California 2026 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles." The 4,000 and full useful life mile test points (or their equivalent) used in determining a DF must be within the standards of section I.E. or data will not be acceptable for use in the calculation of a DF, except for the following provision. For evaporative families certified to the emission standards in section I.E.(e)(i)(B) that utilize the fleet-average option, the 4,000 and full useful life mile test points for the highest whole vehicle diurnal plus hot soak emissions may exceed the emission standards in section I.E.(i)(B), but must be less than the maximum allowed family emission limits set forth in footnote (2) of the table in section I.E.(e)(i)(B).

(b)For evaporative families subject to the requirements of section II.A.2.4.(a), manufacturers may demonstrate compliance by conducting an exhaust and evaporative emission test sequence at the end of the useful life of the exhaust durability data vehicle if the procedure set forth in section II.A.2.3. includes on-road, useful life deterioration on the evaporative test vehicle. The evaporative test vehicle used to meet the criteria in section II.A.2.3. must be deteriorated based on typical customer use throughout the applicable useful life. The manufacturer may perform unscheduled maintenance on the evaporative test vehicle at the final test point only upon prior Executive Officer approval, which shall be granted if the Executive Officer determines that the exhaust emission control system will not be affected, and the manufacturer demonstrates that the effectiveness of the evaporative emission control system is not diminished. The unscheduled maintenance must be conducted in accordance with 40 CFR §86.1834-01 as amended by the "California 2026 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles."

2.5. The evaporative DFs determined under section II.A.2.4., if any, shall be averaged with the evaporative DFs determined under section II.A.2.3. to determine a single evaporative DF for each evaporative/refueling family. Evaporative DFs shall be generated for the running loss test and for the hot soak and the diurnal test in the three-day diurnal sequence, and for the hot soak and the diurnal test in the two-day diurnal sequence. The manufacturer may carry-across the DF generated in the three-day diurnal sequence to the two-day diurnal sequence if the manufacturer can demonstrate that the DF generated in the three-day diurnal sequence is at least as great as the DF generated in the two-day diurnal sequence.

2.6. The fuel used for durability mileage accumulation and component aging shall be the fuel set forth in §86.1824-08 (f)(1) (April 28, 2014).

2.7. Manufacturers are not required to establish deterioration factors for canister bleed emissions.

3. Assigned DFs

3.1. §86.1826-01. (April 28, 2014) [No change.]

3.2. A small volume manufacturer, as defined in section 1900, title 13, CCR, may request to certify evaporative/refueling families using assigned DFs.

3.3. Assigned DFs shall be used only where specific evaporative durability data do not exist. Assigned DFs shall be used in lieu of data from durability vehicle(s) only when a manufacturer demonstrates that it has control over design specifications, can provide development data, has in-house testing capabilities including accelerated aging of components/systems, and has evaluation criteria to ensure emission control system (ECS) durability for the vehicle's useful life. The applying manufacturer must demonstrate that evaporative emission control system(s) developed or adapted for the particular vehicle will be durable and comply with the applicable emission standards for the vehicle's useful life. In evaluating any information provided, all relevant test data and design factors shall be considered, including but not limited to: canister nominal working capacity and location, purge strategy, method of purge control, fuel tank capacity, variables affecting fuel temperature (use of fuel return, material, shape of fuel tank, distance of fuel tank from road surface and distance from exhaust pipe, total underbody airflow), fuel and vapor hose materials, use of sensors and auxiliary control devices, technical comparison to an evaporative emission control system and the durability of any evaporative emission control system components that may have been used in other vehicle applications. The assigned DFs shall be applied only to entire evaporative/refueling families.

3.3.1 If emission control parts from other certified vehicles are utilized, then parameter comparisons of the above data must also be provided including part numbers where applicable. Evaporative emission control durability may include special in-house specifications.

3.4. The criteria for evaluating assigned DFs for evaporative/refueling families are the same as those for exhaust families. However, in determining evaporative/refueling family DFs these test procedures require that an evaporative family DF be determined by averaging DFs obtained from durability vehicle testing and from bench testing. Therefore, if a manufacturer meets the criteria as specified above, the Executive Officer may grant assigned DFs for either (or both) the durability vehicle DF or the bench DF.

3.5. The use of assigned DFs for bench test requirements does not depend upon the small volume manufacturer maximum sales limit (as defined in section 1900(b), title 13, CCR) and is applicable only to evaporative emission control systems which are similar to those used by the manufacturer for 1998 or later model-year vehicles and where an evaporative DF was determined.

4. Emission Data Vehicle Selection

4.1. §86.1828-01 (April 28, 2014) [No change.]

4.2. In selecting medium-duty test vehicles, the Executive Officer shall consider the availability of test data from comparably equipped light-duty vehicles and the size of medium-duty vehicles as it relates to the practicability of evaporative emission testing.

5. Durability and Emission Testing Requirements; waivers

5.1. §86.1829-01 (April 28, 2014). [No change, except as otherwise noted. Changes to items related to refueling testing are contained in the "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles"]

5.2. References to the "EPA" shall mean the Executive Officer of the Air Resources Board.

5.3. The optional provision for a manufacturer to provide a statement of compliance in lieu of a demonstration of compliance with the supplemental two-day diurnal plus hot soak emission standard for certification purposes, as contained in §86.1829-01(b)(2)(iii), shall be applicable to gasoline- and ethanol-fueled passenger cars, light-duty trucks, and medium-duty vehicles, including hybrid electric, fuel-flexible, dual fuel, and bi-fuel vehicles. Heavy-duty vehicles over 14,000 lbs. GVWR and incomplete medium-duty vehicles shall comply with the requirements of section I.D.2.

5.4. For purposes of certification, an plug-in hybrid electric vehicles shall demonstrate the capability to purge its evaporative canister(s) during the exhaust emission test of the supplemental two-day diurnal plus hot soak emission test sequence.

5.4.1 This capability shall be demonstrated through compliance with the supplemental two-day diurnal plus hot soak emission standard, using the test sequence as specified in section III.D.1.17., except that the battery state-of-charge setting prior to the standard three-phase exhaust test shall be at the lowest level allowed by the manufacturer to maximize the cumulative amount of the auxiliary power unit activation during the three-phase exhaust test. Performance of this demonstration shall be in addition to the demonstration of compliance with the supplemental two-

day diurnal plus hot soak emission standard required under section I.E.1., using the test sequence specified in section III.D.1.17.

5.4.2.1 The manufacturer shall specify the working capacity of the evaporative emission control canister, and shall specify the number of 24-hour diurnals that can elapse before the auxiliary power unit will activate solely for the purposes of purging the canister of hydrocarbon vapor.

5.4.2 In lieu of conducting the demonstration described in section II.A.5.4.1., a manufacturer may optionally conduct an engineering evaluation that demonstrates the evaporative emission control system's capability to purge its evaporative canister(s) during the exhaust emission test of the supplemental two-day diurnal plus hot soak emission test sequence. Such an evaluation shall be submitted to the Executive Officer, if requested. The manufacturer shall provide a statement of compliance in the certification application to indicate that the evaporative emission control system will purge the system's evaporative canister(s) during the supplemental two-day diurnal plus hot-soak test sequence. The evaluation shall include canister type, canister volume, canister working capacity, fuel tank volume, fuel tank geometry, fuel delivery system, description of the input parameters and software strategy used to control canister purge, nominal purge flow volume (i.e., amount of bed volumes) achieved by a test vehicle after completing the exhaust test of a supplemental two-day diurnal plus hot soak emission test sequence, and other information necessary to an engineering evaluation based on good engineering judgment.

5.4.2.1 In lieu of the optional engineering demonstration specified in section II.A.5.4.2., manufacturers of plug-in hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems may attest that the system's canister(s) shall have attained a purged condition when the vehicle has consumed at least 85% of its nominal fuel tank capacity.

5.4.2.1.1 This provision shall apply to such non-integrated refueling canister-only systems that inherently allow only refueling vapors to be stored in the canister(s); and, in which the inherent battery-charge operational mode characteristics cause the canister(s) to experience only either no purge or partial purge during the supplemental two-day diurnal plus hot soak test sequence.

5.4.2.1.2 The manufacturer shall provide the following statement in the application for certification, "The canisters in all vehicles equipped with the [indicate a specific evaporative/refueling family] shall have attained a purged condition when the vehicles have consumed at least 85% of their nominal fuel tank capacity. Assurance with this performance is based on the particular design specifications of the evaporative/refueling family, other inherent battery-charge operational mode characteristics of the vehicle's related systems, and other knowledge possessed by the manufacturer. Providing this assurance relieves the manufacturer of conducting a separate engineering evaluation for demonstrating the evaporative/refueling family's capability of purging its canister(s) during a supplemental two-day diurnal plus hot soak emission test sequence in which the battery state-of-charge setting is at the lowest level allowed by the manufacturer."

5.4.2.2 The manufacturer shall provide the specific information that supports its assurance of the system's performance with these requirements when requested by the Executive Officer.

5.4.2.3 The Executive Officer may withdraw the allowance to use the provision specified in section II.A.5.4.2.1., when information, including but not limited to that obtained from in-use vehicle testing, indicates non-compliance by the applicable evaporative/refueling family with the requirement.

5.5. §86.1829-15 (February 19, 2015)

5.5.1 Subparagraphs (a) through (d) [No change.]

5.5.2 Amend subparagraph (e) as follows:

5.5.2.1 Subparagraphs (1) and (2) [n/a] See the "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles"

5.5.2.2 Subparagraph (3) [No change]

5.5.2.3 Subparagraph (4) [No change]

5.5.2.4 Subparagraph (5) [n/a] See the "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles"

5.5.2.5 Subparagraph (6) [No change]

5.5.2.6 Delete subparagraph (7)

5.5.2.7 Delete subparagraph (8)

5.5.2.8 Subparagraph (9) [n/a] See the "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles"

PART III: EVAPORATIVE EMISSION TEST PROCEDURES FOR PASSENGER CARS, LIGHT-DUTY TRUCKS, AND MEDIUM-DUTY VEHICLES

A. Instrumentation

1. Sampling and analytical systems; evaporative emissions.

1.1. §86.107-96. April 28, 2014. Amend as follows:

1.1.1 Subparagraph (a) [No change.]

1.1.2 Amend subparagraph (a)(1) as follows: Reference to the prescribed temperature versus time cycle as specified in §86.133-96 shall instead refer to §86.133-96(c) as amended by section III.D.10. of these test procedures.

1.1.3 Subparagraphs (a)(1)(i) through (a)(1)(ii)(B) [No change.]

1.1.4 Amend subparagraph (a)(2) as follows: Requirement to maintain ambient temperatures during the running loss test at 95±5°F (95±2°F on average) shall instead be maintained at 105±5°F (105±2°F on average).

1.1.5 Amend subparagraph (a)(2)(i) to read as follows: The running loss enclosure may be equipped to supply air to the vehicle, at temperatures of 105±5°F from sources outside of the running loss enclosure directly into the operating engine's air intake system. Supplemental air requirements (e.g., for an air pump) shall be supplied by drawing air from the engine intake source.

1.1.6 Subparagraph (a)(2)(ii) [No change.]

1.1.7 Amend subparagraph (a)(3) to read as follows: The hot soak test may be conducted by holding the vehicle in an enclosure that meets the requirements for either diurnal emission or running loss tests. The enclosure shall be configured to provide an internal enclosure ambient temperature of 105±10°F for the first 5 minutes, and 105±5°F (105±2°F on average) for the remainder of the hot soak test.

1.1.8 Subparagraphs (a)(3)(i) through (c) [No change.]

1.1.9 Amend subparagraph (c)(1) as follows: Reference to the diurnal emission test as described in §86.133 shall instead refer to §86.133-96 as amended by section III.D.10. of these test procedures.

1.1.10 Subparagraph (c)(2) [No change.]

1.1.11 Amend subparagraph (d) as follows: Reference to fuel temperature control of the test vehicle as specified in §86.134(g)(1)(xv) shall instead refer to section III.D.8.1.8.1. of these test procedures.

1.1.12 Subparagraphs (d)(1) through (d)(3) [No change.]

1.1.13 Amend subparagraph (d)(4) as follows: Reference to fuel temperature control of the test vehicle as specified in §86.134(g)(1)(xv) shall instead refer to section III.D.8.1.8.1. of these test procedures.

1.1.14 Subparagraph (e) [No change.]

1.1.15 Amend subparagraph (f) as follows: Reference to the outdoor driving procedure specified in §86.129-94(d) shall instead refer to §86.129-94(d) as amended by section III.C. of these test procedures.

1.1.16 Subparagraphs (g) through (h)(3) [No change].

1.1.17 Amend subparagraph (i) as follows: Requirement to maintain ambient temperatures during the running loss test at 95±5°F (95±2°F on average) shall instead be maintained at 105±5°F (105±2°F on average).

1.2. §86.107-98(e)(1). August 23, 1995. Amend as follows: Reference to manufacturers arranging vehicles to be furnished to federal certification facilities with temperature sensors installed for measuring fuel tank temperature shall, instead, require manufacturers to arrange these vehicles with the temperature sensors installed as previously described to state testing facilities.

B. Calibrations

1. §86.117-96. April 28, 2014. Amend as follows:

1.1. Subparagraph (a) [No change.]

1.2. Amend subparagraph (a)(1)(i) as follows: Replace ambient temperatures of 96±3°F throughout the 4-hour period with 105±3°F throughout the 4 hour period.

1.3. Amend subparagraph (a)(1)(ii) as follows: Replace ambient temperatures of 96±3°F throughout the 4-hour period with 105±3°F throughout the 4 hour period.

1.4. Amend subparagraph (a)(1)(iii) as follows: Replace ambient temperatures of 96±3°F throughout the 4-hour period with 105±3°F throughout the 4 hour period. For running loss enclosures, the vehicle air supply system or vent for makeup air shall be closed.

1.5. Subparagraph (a)(2) through (a)(8) [No change.]

1.6. Amend subparagraph (a)(9) to read as follows: Calculate the mass change of methanol, hydrocarbons, and hydrocarbons plus methanol in the enclosure according to the equations in paragraph (d) as amended by this section III.B. of these test procedures.

1.7. Amend subparagraph (b)(1) to include the following: Variable-volume enclosures with volume measuring capability shall have an accuracy within ±0.5 percent of actual measured volume.

1.8. Subparagraph (c) [No change.]

1.9. Amend subparagraph (c)(1) as follows: Reference to the diurnal emission test in §86.133-96 shall instead refer to §86.133-96 as amended by section III.D.10. of these test procedures.

1.10. Subparagraphs (c)(1)(i) through (c)(1)(iv) [No change.]

1.11. Amend subparagraph (c)(1)(v) as follows: Replace temperature setting of 96°F (36°C) with 105°F.

1.12. Amend subparagraph (c)(1)(vi) as follows: Replace stabilization temperature of 96±3°F (36±2°C) with 105°±3°F.

1.13. Subparagraphs (c)(1)(vii) through (c)(1)(viii) [No change.]

1.14. Amend subparagraph (c)(1)(ix) as follows: Reference to paragraphs (c)(1)(vi) and (d) shall instead refer to subparagraphs (c)(1)(vi) and (d) as amended by this section III.B. of these test procedures.

1.15. Subparagraph (x) [No change.]

1.16. Amend subparagraph (c)(1)(xi) as follows: Start cycling the ambient temperature from 105°F to 65°F and back to 105°F over a 24-hour period, according to the profile specified in §86.133-96(c), as amended by section III.D.10. of these test procedures, within 15 minutes of sealing the enclosure.

1.17. Amend subparagraph (c)(1)(xii) as follows: Reference to paragraph (d) shall instead refer to subparagraph (d) as amended by this section III.B. of these test procedures.

1.18. Amend subparagraph (c)(2) to read as follows: An enclosure to be used for the running loss test (see section III.D.8. of these test procedures) shall meet the calibration and retention requirements as follows:

1.18.1 Zero and span (calibrate if required) the hydrocarbon analyzer.

1.18.2 Close the vehicle air supply system and vehicle exhaust port for the enclosure.

1.18.3 Purge the enclosure until a stable background hydrocarbon reading is obtained.

1.18.4 Turn on the mixing blowers (if not already on).

1.18.5 Turn on the ambient temperature control system (if not already on) and set it to 105°F. On variable-volume enclosures, latch the enclosure to the appropriate volume position for 105°F. On fixed-volume enclosures close the outlet and inlet flow streams.

1.18.6 When the enclosure stabilizes at 105±3°F, seal the enclosure and measure background hydrocarbon concentration, background methanol, enclosure temperature, and barometric pressure. These are the initial measurements C_{HCi}, C_{CH3OHi}, T_i, and P_{Bi} for the enclosure calibration.

1.18.7 For variable-volume enclosures, unlatch the enclosure from the nominal volume configuration. For fixed-volume enclosures, open the outlet and inlet flow streams, and monitor air flowing into and out of the enclosure in accordance with 40 CFR §86.107-96(a)(1)(ii)(B).

1.18.8 Inject into the enclosure 2 to 6 grams (4 grams is a convenient quantity) of pure methanol at a recommended temperature of at least 150°F (65 °C) and/or 2 to 6 grams (4 grams is a convenient quantity) of pure propane at lab ambient temperature while a full electric vehicle is driven in the enclosure over one Urban Dynamometer Driving Schedule (UDDS), as described in appendix I of 40 CFR §86.115-78. The injected quantity may be measured by volume flow or by mass measurement. The method used to measure the quantity of methanol and propane must have an accuracy of ±0.5 percent of the measured value (less accurate methods may be used with the advance approval of the Executive Officer). The methanol and propane tests do not need to be conducted simultaneously.

1.18.9 After a minimum of 5 minutes of mixing, analyze the enclosure atmosphere for hydrocarbon and methanol content, also measure enclosure temperature and barometric pressure. These are the final measurements for the enclosure calibration as well as the initial measurements for the retention check.

1.18.10 To verify the enclosure calibration, calculate the net mass of propane and the net mass of methanol using the measurements taken in paragraphs 1.18.6. and 1.18.9. of this section (for calculations, see §86.117-96(d) as amended by this section III.B. of these test procedures). The calculated net methanol and hydrocarbon mass must be within ±2 percent of that injected in paragraph 1.18.8. of this section for propane and ±5 percent for methanol. Evaluate long-term trends using good engineering judgment to minimize measurement bias. Keep records to document such evaluations and make them available to EPA upon request.

1.18.11 Allow the enclosure to remain sealed for a minimum of 4 hours.

1.18.12 At the completion of the 4-hour period, analyze the enclosure atmosphere for hydrocarbon and methanol content; determine the net withdrawn methanol (in the case of running loss emission testing with fixed volume enclosures); measure enclosure temperature and barometric pressure. These are the final measurements for the hydrocarbon and methanol retention check. The final net hydrocarbon and methanol mass shall be within ±4 percent of that determined in paragraph 1.18.9. of this section. For calculations, see §86.117-96(d) as amended by this section III.B. of these test procedures).

1.19. Amend subparagraph (c)(3) as follows: Enclosures calibrated according to the procedures specified in either paragraph (c)(1) or (c)(2), as amended by this section III.B. of these test procedures, may be used for hot soak testing (see §86.138-96 as amended by section III.D.9. of these test procedures).

1.20. Subparagraphs (d) through (d)(3) [No change.]

1.21. Add subparagraph (d)(4) as follows: For variable-volume enclosures, defined in §86.107(a)(1)(i), the following full form of the hydrocarbon mass change equation may be used:

$$M_{HC} = (k \times 10^{-4}) \times \left[\left(\frac{(C_{HCf} - rC_{CH3OHf})P_{Bf}V_f}{T_f}\right) - \left(\frac{(C_{HCi} - rC_{CH3OHi})P_{Bi}V_i}{T_i}\right)\right]$$

Where:

M_{HC} = Hydrocarbon mass change, g.

C_{HC} = FID hydrocarbon concentration as ppm carbon, that is, ppm propane × 3, including FID response to methanol in the sample.

C_{HC30H} = Methanol concentration as ppm carbon.

r = FID response factor to methanol.

k = 3.05

V = Measured enclosure volume ft^3 subtracting 50 ft^3 for the test vehicle: V = (Measured enclosure volume) – 50 ft^3.

[Note: V as measured by enclosure volume measuring system, see §86.117-96(b)(1) as amended by this section III.B. of these test procedures.]

P_B = Barometric pressure, in-Hg (Enclosure pressure, in-Hg, may be substituted for barometric pressure).

T = Enclosure ambient temperature, °R.

i = Indicates initial reading.

f = Indicates final reading.

C. Road Load Power, Test Weight, Inertia Weight Class, and Running Loss Fuel Tank Temperature Profile Determination

1. 86.129-94. October 6, 2000. Amend as follows:

1.1. Subparagraphs (a) through (d) [No change.]

1.2. Amend subparagraph (d)(1)(i) as follows: Reference to the running loss test as specified in §86.134 shall instead refer to the running loss test as specified in section III.D.8. of these test procedures.

1.3. Subparagraphs (d)(1)(ii) through (d)(1)(iii) [No change.]

1.4. Delete subparagraph (d)(1)(iv) and replace with the following: Small-volume manufacturer requirements as specified in these test procedures shall apply.

1.5. Subparagraphs (d)(1)(v) through (d)(4) [No change.]

1.6. Amend subparagraph (d)(4)(i) as follows: Reference to test fuel specifications in §86.113 shall instead refer to specifications in section F of these test procedures. In addition, for plug-in hybrid electric vehicles, the battery state-of-charge shall be set at the level that results when the battery state-of-charge is initially set at the highest level allowed by the manufacturer and then decreased, as applicable, by driving a standard three-phase exhaust test.

1.7. Amend subparagraph (d)(4)(ii) by adding the following language: To move plug-in hybrid electric vehicles to the location where the data is to be collected, the vehicle shall be either only pushed or towed to avoid disturbing the battery state-of-charge setting.

1.8. Subparagraph (d)(4)(ii)(A) [No change.]

1.9. Amend subparagraph (d)(4)(ii)(B) to read as follows: The vehicle may be soaked in a temperature-controlled environment to stabilize fuel temperatures. Before starting the drive, the vehicle shall be stabilized with liquid fuel temperature and the vapor temperature 105±3°F for at least one hour. The fuel temperature may not exceed 108°F at any time before the beginning of the driving schedule, during which only whole-vehicle heating and cooling may be used to control fuel temperatures. If a manufacturer uses the provisions of paragraph (d)(7)(v), as amended by this section III.C. of these test procedures, to establish a lower initial fuel temperature for the running loss test, the fuel in the test vehicle may not be stabilized at a temperature higher than the newly established initial fuel temperature.

1.10. Amend subparagraph (d)(4)(iii) as follows: Reference to vehicle stabilization according to paragraph(d)(4)(ii) shall instead refer to subparagraph (d)(4)(ii) as amended by this section III.C. of these test procedures.

1.11. Subparagraphs (d)(4)(iv) through (d)(7)(iii). [No change.]

1.12. Amend subparagraph (d)(7)(iv) to read with no change except that the absolute liquid fuel and vapor fuel temperature profiles are determined by adding 105°F, instead of 95°F, to each point of the relative liquid fuel and vapor fuel temperature profiles, respectively.

1.13. Amend subparagraph (d)(7)(v) to read as follows: The initial fuel and, if applicable, vapor temperatures for the running loss test may be less than 105ºF with advance Executive Officer approval if the manufacturer is able to provide data justifying initial temperatures at least 3ºF lower than the required 105ºF starting temperature. The test data shall include the maximum fuel temperatures experienced by the vehicle during an extended parking event and after a UDDS cycle and be conducted on a day which meets the ambient conditions specified in paragraph (d)(3) of this section, except the ambient temperature must be at least 105ºF. During the profile generation, the temperature offset shall apply.

D. Test Procedure

The test sequence described in 40 CFR §86.130 through §86.140 shall be performed with the following modifications:

1. General Requirements

1.0. The following language shall be applicable in lieu of 40 CFR §86.130-78:

1.1. The test sequence shown in Figure 2 (Figure 3A for hybrid electric vehicles) describes the steps encountered as the vehicle undergoes the three-day diurnal sequence and the supplemental two-day diurnal sequence to determine conformity with the standards set forth. Methanol measurements may be omitted when methanol-fueled vehicles will not be tested in the evaporative enclosure. Ethanol shall be accounted for via measurement or mass adjustment factor, using the methods described in this test procedure, for vehicles tested with gasoline containing 10 percent ethanol by volume. Ambient temperature levels encountered by the test vehicle throughout the entire duration of this test sequence shall not be less than 68°F nor more than 86°F, unless otherwise specified. The temperatures monitored during testing shall be representative of those experienced by the test vehicle. The test vehicle shall be approximately level during all phases of the test sequence to prevent abnormal fuel distribution. The temperature tolerance of a soak period may be waived for up to 10 minutes to allow purging of the enclosure or transporting the vehicle into the enclosure.

1.2. If tests are invalidated after collection of emission data from previous test segments, the test may be repeated to collect only those data points needed to complete emission measurements. Compliance with emission standards may be determined by combining emission measurements from these different test runs. If any emission measurements are repeated, the new measurements supersede previous values.

1.3. The three-day diurnal test sequence shown in Figure 2 (and Figure 3A for hybrid electric vehicles) is briefly described as follows.

1.4. For plug-in hybrid electric vehicles, a manufacturer may elect to perform the All-Electric Range Test separately from the test sequences specified under these evaporative emission test procedures, and pursuant to the “California Test Procedures for 2026 and Subsequent Model Zero-Emission Vehicles and Plug-in Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes,” as applicable.

1.5. The vehicle preconditioning shall be performed in accordance with 40 CFR §86.132-00, except as amended by section III.D.3. of these test procedures.

1.5.1 For plug-in hybrid electric vehicles, the vehicle preconditioning drive 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 the "California Test Procedures for 2026 and Subsequent Model Zero-Emission Vehicles and Plug-in Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes" shall not apply.

1.6. For plug-in hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, the following exceptions apply.

1.6.1 After completion of the vehicle preconditioning drive, the second fuel drain and tank refill step specified in 40 CFR §86.132-00(f)(1) shall be replaced by the 95% tank fill step specified in 40 CFR 86.153-98(d).

1.6.2 After completion of the second fuel drain and tank refill step, the initial testing state of the canister shall be established by purging while performing 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. 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.

1.6.3 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 §86.132-00(c)(1), or after the vehicle preconditioning drive step specified in section III.D.1.5.1., in lieu of performing the second fuel drain/fill and vehicle drivedown steps specified in sections III.D.1.6.1. and III.D.1.6.2. 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 III.D.1.6.4. shall be performed.

1.6.4 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.

1.6.4.1. In lieu of performing the drain and fill step specified in section III.D.1.6.4., the required 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.

1.6.5 After completion of the third fuel drain and fill step, a second vehicle soak period of not less than 6 hours and not more than 24 hours shall be performed.

1.6.6 After completion of the second vehicle soak period, the fuel-tank-refill canister-loading step specified in section III.D.3.3.6. shall be performed.

1.6.7 After completion of the canister loading, a fourth drain and fill step shall be performed, as specified in section III.D.3.3.6.13.

1.6.8 After completion of the fourth drain and fill step, a third preconditioning soak period of not less than 12 hours and not more than 36 hours shall be performed.

1.6.9 After completion of the 12-to-36 hour preconditioning soak period, a test vehicle shall proceed to the exhaust emission test specified in section III.D.1.10. Exhaust emission sampling is not required during this step.

1.6.10 When conducting only an exhaust emission test sequence, a manufacturer may elect to perform the canister preconditioning and loading method specified in sections III.D.1.8., III.D.1.9., and III.D.3.3.4., in lieu of the canister loading method specified in sections III.D.1.6.6. and III.D.3.3.6. Under such an election, the exceptions specified in sections III.D.1.6.4., III.D.1.6.5., and III.D.1.6.6. shall not apply.

1.6.10.1 The Executive Officer may elect to use either canister loading method when conducting exhaust emission testing for certification confirmatory testing and in-use compliance purposes.

1.7. A second preconditioning soak period of not less than 12 hours and not more than 36 hours shall be performed prior to the exhaust emission test.

1.8. During the 12-to-36 hour soak specified in section III.D.1.7. above, the vehicle's evaporative control canister shall be purged with a volume of air equivalent to 300 carbon canister bed volumes at a flow rate of 48 SCFH (22.7 slpm).

1.9. The evaporative control canister shall then be loaded using a butane-nitrogen mixture.

1.10. Perform exhaust emission tests in accordance with procedures as provided in the "California 2026 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles," and these procedures.

1.11. Requirements specific to hybrid electric vehicles:

1.11.1 For hybrid electric vehicles, a manufacturer may elect to perform the four-phase exhaust emission test separately from the test sequence specified under these evaporative emission test procedures, and pursuant to the "California Test Procedures for 2026 and Subsequent Model Zero-Emission Vehicles and Plug-in Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as applicable.

1.11.2 When a four-phase exhaust test is performed with the evaporative emission test sequence as shown in Figure 3A, the evaporative emission test sequence shall begin at the second drain and fill step in the test sequence, after the four-phase exhaust test is completed. The ensuing standard three-phase exhaust test shall then be performed without exhaust emission sampling.

1.11.3 For hybrid electric vehicles, except for plug-in hybrid electric vehicles, battery state-of-charge setting prior to the standard three-phase test shall be performed pursuant to the supplemental requirements specified in "California Test Procedures for 2026 and Subsequent Model Zero-

Emission Vehicles and Plug-in Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as applicable.

1.11.4 For plug-in hybrid electric vehicles, battery state-of-charge setting prior to the standard three-phase test shall be at the highest level allowed by the manufacturer to eliminate or minimize the cumulative amount of the auxiliary power unit activation during either of the ensuing three-phase exhaust or running loss tests. This requirement shall be applicable regardless of a vehicle's ability to allow, or not to allow, manual activation of the auxiliary power unit. If off-vehicle charging is required to increase the battery state-of-charge for the proper setting, then this charging shall occur during the 12-to-36 hour soak period. The battery state-of-charge net change tolerance provisions specified in the "California Test Procedures for 2026 and Subsequent Model Zero-Emission Vehicles and Plug-in Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes" shall not apply.

1.12. Upon completion of the hot start test, the vehicle shall be parked in a temperature-controlled area between one to six hours to stabilize the fuel temperature at 105ºF for one hour. Artificial cooling or heating of the fuel tank may be induced to achieve a fuel temperature of 105ºF. The initial fuel and, if applicable, vapor temperatures for the running loss test may be less than 105ºF with advance Executive Order approval if the manufacturer is able to provide data demonstrating initial temperatures at least 3ºF lower than the required 105ºF starting temperature.

1.13. A running loss test shall be performed after the fuel tank is stabilized at 105ºF. The fuel tank temperature shall be controlled using a specified tank temperature profile for that vehicle during the test. The temperature profile shall be achieved either using temperature controllers or by an air management system that would simulate airflow conditions under the vehicle during driving.

1.14. The hot soak enclosure test shall then be performed at an enclosure ambient temperature of 105ºF.

1.15. Upon completion of the hot soak enclosure test, the vehicle shall be soaked for not less than 6 hours and not more than 36 hours. For at least the last 6 hours of this period, the vehicle shall be soaked at 65ºF.

1.16. A three-day diurnal test shall be performed in a variable temperature enclosure.

1.17. The supplemental two-day diurnal sequence in Figure 2 (and Figure 3A for hybrid electric vehicles) shall be conducted according to sections III.D.1.4. through III.D.1.16., with the following exceptions:

1.17.1 Sections III.D.1.8., III.D.1.12., and III.D.1.13., shall not apply,

1.17.2 In section III.D.1.14., the ambient temperature of the hot soak test is conducted at an ambient temperature between 68ºF and 86ºF at all times.

1.17.3 In section III.D.1.16., the diurnal test will consist of a two-day test.

1.17.4 For hybrid electric vehicles, except for plug-in hybrid electric vehicles, battery state-of-charge setting prior to the standard three-phase test in the supplemental two-day diurnal test sequence shall be performed pursuant to the supplemental requirements specified in “California Test Procedures for 2026 and Subsequent Model Zero-Emission Vehicles and Plug-in

Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as applicable.

1.17.5 For plug-in hybrid electric vehicles, battery state-of-charge setting prior to the standard three-phase exhaust test in the supplemental two-day diurnal sequence shall be at the highest level allowed by the manufacturer in order to eliminate or minimize the cumulative amount of the auxiliary power unit activation during either of the ensuing three-phase exhaust or running loss tests. This requirement shall be applicable regardless of a vehicle's ability to allow, or not to allow, manual activation of the auxiliary power unit. If off-vehicle charging is required to increase the battery state-of-charge for the proper setting, then this charging shall occur during the 12-to-36 hour soak period. The battery state-of-charge net change tolerance provisions specified in "California Test Procedures for 2026 and Subsequent Model Zero-Emission Vehicles and Plug-in Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes" shall not apply.

1.17.6 Emission sampling is not required for the standard three-phase exhaust test performed in the supplemental two-day diurnal test sequence shown in Figure 3A.

1.18. The Executive Officer may conduct certification confirmatory tests and in-use compliance tests of plug-in hybrid electric vehicles using any of the following battery state-of-charge levels:

1.18.1 As specified in sections III.D.1.11.4. or III.D.1.17.5., as applicable.

1.18.2 At the lowest level allowed by the manufacturer.

1.18.3 At any level in-between the levels indicated by sections III.D.1.18.1. and III.D.1.18.2., above, if applicable.

2. Vehicle Preparation

2.1. §86.131-96. April 28, 2014. Amend as follows:

2.1.1 Subparagraphs (a) through (c). [No change.]

2.1.2 Amend subparagraph (d) as follows: References to paragraphs §86.107-96(e) and (f) shall instead refer to subparagraphs §86.107-96(e) and (f) as amended by section III.A. of these test procedures.

2.1.3 Subparagraphs (e) through (g). [No change.]

3. Vehicle Preconditioning

3.1. For supplemental vehicle preconditioning requirements for hybrid electric vehicles, refer to the "California Test Procedures for 2026 and Subsequent Model Zero-Emission Vehicles and Plug-in Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as applicable.

3.2. The following language shall be applicable in lieu of 40 CFR §86.132-00(e).

The Executive Officer may also choose to conduct or require the performance of optional or additional preconditioning to ensure that the evaporative emission control system is subjected to conditions typical of normal driving. The optional preconditioning shall consist of no less than 20 and no more than 50 miles of on-road mileage accumulation under typical driving conditions.

3.3. The vehicle preconditioning shall be performed in accordance with 40 CFR §86.132-00(f) through (j), except when amended by the following language.

3.3.1 Within five minutes of completion of vehicle preconditioning drive, the vehicle shall be driven off the dynamometer to a work area. For hybrid electric vehicles following battery state-of-charge setting, the vehicle shall only be pushed or towed to avoid disturbing the battery state-of-charge setting.

3.3.2 Except for plug-in hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, the fuel tank(s) of the prepared vehicle shall undergo the second fuel drain and fill step of the test sequence, with the applicable test fuel, as specified in section III.F. of these procedures, to the prescribed tank fuel volume of 40 percent of the manufacturer's nominal fuel tank capacity, as defined in 40 CFR §86.1803-01. The vehicle shall be refueled within 1 hour of completion of the preconditioning drive.

3.3.2.1 For plug-in hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, the exceptions specified in sections III.D.1.7.1 through III.D.1.7.10., shall apply, along with the applicable test fuel specified in section III.F.

3.3.3 Following the second fuel drain and fill described in section III.D.3.3.2. above, the test vehicle shall be allowed to soak for a period of not less than 12 and not more than 36 hours prior to the exhaust emissions test. Except for plug-in hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, during the soak period, the canister shall be connected to a pump or compressor and loaded with butane as described in section III.D.3.3.4. below for the three-day diurnal sequence and in section III.D.3.3.5. below for the supplemental two-day diurnal sequence. For all vehicles subjected to exhaust emissions testing only, the canister loading procedure as set forth in section III.D. 3.3.4. below shall be used. For plug-in hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, the canister shall be loaded according to the fuel-tank-refill canister-loading method specified in section III.D.3.3.6., for both the three-day diurnal sequence and the supplemental two-day diurnal sequence.

3.3.3.1 For methanol-fueled and flexible-fueled vehicles, canister preconditioning shall be performed with a fuel vapor composition representative of that which the vehicle would generate with the fuel mixture used for the current test. Manufacturers shall develop a procedure to precondition the canister, if the vehicle is so equipped for the different fuel. The procedure shall represent a canister loading equivalent to that specified in section III.D.3.3.4. below for the three-day diurnal sequence and in section III.D.3.3.5. below for the supplemental two-day diurnal sequence and shall be approved in advance by the Executive Officer.

3.3.4 For the three-day diurnal sequence, the evaporative emissions storage canister(s) shall be preloaded with an amount of butane equivalent to 1.5 times the nominal working capacity. For vehicles with multiple canisters in a series configuration, the set of canisters must be preconditioned as a unit. For vehicles with multiple canisters in a parallel configuration, each canister shall be preconditioned separately. For vehicles equipped with a nonintegrated refueling emission control system, the nonintegrated canisters shall be preconditioned for the three-day diurnal test sequence according to the procedure in section III.D.3.3.5.1. All 2012 and subsequent model-year plug-in hybrid electric vehicles equipped with non-integrated refueling canister-only systems shall be preconditioned for the three-day diurnal test sequence according to the procedure specified in section III.D.3.3.6., unless a manufacturer is conducting only an exhaust

emission test sequence, in which case the optional canister preconditioning and loading method allowed by section III.D.1.7.10. may apply. If a vehicle is designed to actively control evaporative or refueling emissions without a canister, the manufacturer shall devise an appropriate preconditioning procedure subject to the approval of the Executive Officer. If canisters on both certification and production vehicles are equipped with purge and load service ports, the service port shall be used for the canister preconditioning. The nominal working capacity of a carbon canister shall be established by determining the mass of butane required to load a stabilized canister to a 2-gram breakthrough. The 2-gram breakthrough is defined as the point at which the cumulative quantity of hydrocarbons emitted is equal to 2 grams, as defined in section I.B.1.3. The determination of nominal capacity shall be based on the average capacity of no less than five canisters which are in a stabilized condition. For stabilization, each canister must be cycled no less than 10 times and no more than 100 times to a 2-gram breakthrough with a 50/50 mixture by volume of butane and nitrogen, at a rate of 15 ± 2 grams butane per hour. Each canister loading step must be preceded by canister purging with 300 canister bed volume exchanges at 48 SCFH. The following procedure shall be used to preload the canister:

3.3.4.1 Prepare the evaporative emission canister(s) for the canister purging and loading operation. The canister shall not be removed from the vehicle, unless access to the canister in its normal location is so restricted that purging and loading can only reasonably be accomplished by removing the canister from the vehicle. Special care shall be taken during this step so that the normal functions of the fuel system components or the normal pressure relationships in the system are not disturbed. The canister purge shall be performed with ambient air of controlled humidity to 50 ± 25 grains per pound of dry air. This may be accomplished by purging the canister in a room which is conditioned to this level of absolute humidity. The flow rate of the purge air shall be maintained at a nominal flow rate of 48 SCFH (22.7 slpm), and the duration shall be determined to provide a total purge volume flow through the canister equivalent to 300 carbon canister bed volume exchanges.

3.3.4.1.1 The evaporative emission canister(s) shall then be loaded with an amount of commercial grade butane vapors equivalent to 1.5 times the nominal working capacity. Canister loading shall not be less than 1.5 times the nominal canister capacity. The canister shall be loaded with a mixture composed of 50 percent butane and 50 percent nitrogen by volume. The butane shall be loaded into the canister at a rate of 15 ± 2 grams of butane per hour. If the canister loading at this rate takes longer than 12 hours, a manufacturer may determine a new rate, based on completing the canister loading in no less than 12 hours. A Critical Flow Orifice (CFO) butane injection device, a gravimetric method, or electronic mass flow controllers shall be used to fulfill the requirements of this step. The time of completion of the canister loading activity shall be recorded. Manufacturers shall disclose to the Executive Officer their canister loading procedure. The protocol may not allow for the replacement of components. In addition, the Executive Officer may require that the manufacturer demonstrate that the procedure does not unduly disturb the components of the evaporative system.

3.3.4.1.2 Reconnect the evaporative emission canister(s), if applicable.

3.3.5 For the supplemental two-day diurnal sequence, the evaporative emission storage canister(s) shall be loaded to the point of breakthrough using the method specific in either section III.D.3.3.5.1. or section III.D.3.3.5.2. For vehicles with multiple canisters in a series configuration, the set of canisters must be preconditioned as a unit. For vehicles with multiple canisters in a parallel configuration, each canister shall be preconditioned separately. For vehicles equipped with a non-integrated refueling emission control system, the non-integrated canisters shall be preconditioned for the supplemental two-diurnal test sequence according to the procedure in section III.D.3.3.5.1. Breakthrough may be determined by emission measurement in an enclosure or by measuring the weight gain of an auxiliary evaporative canister connected downstream of the vehicle's canister, in which case, the following references to the enclosure can be ignored. The auxiliary canister shall be well purged with ambient

air of humidity controlled to 50±25 grains per pound of dry air prior to loading. Breakthrough is defined as the point at which the cumulative quantity of hydrocarbons emitted is equal to 2 grams, as defined in section I.B.1.3.

3.3.5.1 The following procedure provides for loading of the canister to breakthrough with a mixture composed of 50 percent butane and 50 percent nitrogen by volume. If the canisters on both certification and production vehicles are equipped with purge and load service ports, the service port shall be used for the canister preconditioning.

3.3.5.1.1 Prepare the evaporative/refueling emission canister(s) for the canister loading operation. The canister shall not be removed from the vehicle, unless access to the canister in its normal location is so restricted that loading can only reasonably be accomplished by removing the canister from the vehicle. Special care shall be taken during this step to avoid damage to the components and the integrity of the fuel system. The evaporative emission enclosure shall be purged for several minutes. The FID hydrocarbon analyzer shall be zeroed and spanned immediately prior to the canister loading procedure. If not already on, the evaporative enclosure mixing fan shall be turned on at this time. Place the vehicle in the sealed enclosure and measure emissions with the FID.

3.3.5.1.2 Load the canister with a mixture composed of 50/50 mixture by volume of butane and nitrogen at a rate of 40 ± 2 grams butane per hour. As soon as the canister reaches breakthrough, the vapor source shall be shut off.

3.3.5.1.3 Reconnect the evaporative/refueling emission canister, if applicable.

3.3.5.2 The following procedure provides for loading the canister with repeated diurnal heat builds to breakthrough.

3.3.5.2.1 The evaporative emission enclosure shall be purged for several minutes. The FID hydrocarbon analyzer shall be zeroed and spanned immediately prior to the diurnal heat builds. If not already on, the evaporative enclosure mixing fan shall be turned on at this time. The average temperature of the dispensed fuel shall be 60 ± 12°F. Within one hour of being refueled, the vehicle shall be placed, with the engine shut off, in the evaporative emission enclosure. The fuel tank temperature sensor shall be connected to the temperature recording system. A heat source, specified in 40 CFR §86.107-96(d)(4) as amended by section III.A. of these test procedures, shall be properly positioned with respect to the fuel tank(s) and connected to the temperature controller.

3.3.5.2.2 The fuel may be artificially heated or cooled to the starting diurnal temperature of 65°F. Turn off purge blower (if not already off); close and seal enclosure doors; and initiate measurement of the hydrocarbon level in the enclosure. When the fuel temperature reaches 65°F, start the diurnal heat build. The diurnal heat build should conform to the following function to within ± 4°F:

$F = T_o \pm 0.4t$

F is the fuel temperature, °F

T_o is the initial temperature, °F

t is the time since beginning of test, minutes

3.3.5.2.3 As soon as breakthrough occurs or when the fuel temperature reaches 105°F, whichever occurs first, the heat source shall be turned off, the enclosure doors shall be unsealed and opened. If breakthrough has not occurred by the time the fuel temperature reaches 105°F, the heat source shall be removed from the vehicle, the vehicle shall be removed (with the engine still off) from the evaporative emission enclosure and the entire procedure outlined above shall be repeated until breakthrough occurs.

3.3.5.2.4 After breakthrough occurs, the fuel tank(s) of the prepared vehicle shall be drained and filled with test fuel, as specified in section III.F. of these procedures, to the “tank fuel volume” defined in 40 CFR §86.1803-01. The fuel shall be stabilized to a temperature within ± 3°F of the lab ambient temperature before beginning the driving cycle for the exhaust emission test.

3.3.6 After the soak period specified in section III.D.1.7.5., is completed, the canister for a 2012 and subsequent model-year plug-in hybrid electric vehicles equipped with a non-integrated refueling canister-only system shall be preconditioned and loaded according to the following steps. Prior to conducting the applicable test sequence, the canister shall have already achieved a stabilized state, such as is accomplished using the stabilization method described in section III.D.3.3.4. Good engineering practice and safety considerations, such as, but not limited to, adequate ventilation and appropriate electrical groundings, shall apply.

3.3.6.1 Ambient temperature levels encountered by the test vehicle throughout these steps shall not be less than 68ºF (20ºC) or more than 86ºF (30ºC).

3.3.6.2 The test vehicle shall be approximately level, during the performance of these steps, to prevent abnormal fuel distribution.

3.3.6.3 In order to be moved, the test vehicle shall be pushed, as necessary, without starting its engine, throughout the performance of these steps.

3.3.6.4 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. The refueling canister may remain isolated from the refueling system during this soak period to prevent any abnormal purging or loading of the canister during this soak period. During certification, the manufacturer shall report whether the canister was isolated or not, and the same method shall be used for any state testing.

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

3.3.6.6 The test vehicle's fuel fill pipe cap shall be removed.

3.3.6.7 The dispensed fuel temperature recording system shall be started.

3.3.6.8 The fuel nozzle shall be inserted into the fill pipe neck of the test vehicle, to its maximum penetration, and the refueling operation shall start. The plane of the nozzle's handle shall be approximately perpendicular to the floor. If using federal certification fuel: 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 79º±1.5ºF (26.1º±0.8ºC), 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.

3.3.6.9 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.

3.3.6.10 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.

3.3.6.11 The refueling canister may 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 any state testing.

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

3.3.6.13 After the fuel-tank-refill canister-loading process is completed, a fourth fuel drain and fill step shall be performed. The fuel tank shall be filled to the prescribed fuel tank volume of 40 percent of the manufacturer's nominal fuel tank capacity, as specified in 40 CFR §86.1803-01. When the refueling canister is isolated from its system, fuel vapors shall be allowed to be vented out of the fuel tank, as appropriate, during this refilling step. The required fuel tank volume of 40 percent may be accomplished by using a measured drain of the fuel tank, in place of the specified complete fuel tank drain and fill step.

3.3.6.14 Upon completion of the fourth fuel drain and fill step, the test vehicle shall proceed to the 12-to-36 hour preconditioning soak step which is performed prior to the three-phase exhaust cold start test step. The canister shall not be isolated from its system during this soak step, and shall not be isolated from its system from this point onward in the test sequence.

3.3.6.15 The Executive Officer may approve modifications to this fuel-tank-refill canister-loading method when such modifications are supported by good engineering judgment, and do not reduce the stringency of the method.

3.4. As allowed under the provisions of section III.G. of these test procedures, a manufacturer may propose, for Executive Officer approval, the use of an alternative method to precondition canisters in lieu of the methods required under sections III.D.3.3.4.; III.D.3.3.5.1.; and, III.D.3.3.5.2., and III.D.3.3.6. The Executive Officer may conduct certification confirmatory tests and in-use compliance tests with the either the alternative canister loading method or the methods specified in sections III.D.3.3.4; III.D.3.3.5.1.; III.D.3.3.5.2.; and, III.D.3.3.6, as applicable.

4. Dynamometer Procedure.

4.1. To be conducted according to 40 CFR §86.135-90.

4.2. For hybrid electric vehicles, the dynamometer procedure shall be performed pursuant to the "California Test Procedures for 2026 and Subsequent Model Zero-Emission Vehicles and Plug-in Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as applicable.

5. Engine Starting and Restarting.

5.1. Amend 40 CFR §86.136-90 to read as follows:

5.1.1 Revise subparagraph (c) to read: Except for hybrid electric vehicles, if the vehicle does not start after the manufacturer's recommended cranking time (or 10 continuous seconds in the absence of a manufacturer's recommendation), cranking shall cease for the period recommended by the manufacturer (or 10 seconds in the absence of a manufacturer's recommendation). This may be repeated for up to three start attempts. If the vehicle does not start after three attempts, the reason for failure to start shall be determined. The gas flow measuring device on the CVS (usually a revolution counter) or CFV shall be turned off and the sampler selector valves, including the alcohol sampler, placed in the "standby" position during this diagnostic period. In addition, either the CVS should be turned off, or the exhaust tube disconnected from the tailpipe during the diagnostic period. If failure to start is an operational error, the vehicle shall be rescheduled for testing from a cold start.

5.2. The engine starting and restarting provisions of 40 CFR §1066.415 may be followed as an alternative to 40 CFR §86.136-90.

6. Dynamometer Test Run, Gaseous and Particulate Emissions.

6.1. To be conducted according to 40 CFR §86.137-94.

6.2. For hybrid electric vehicles, the dynamometer test run, gaseous and particulate emissions shall be performed pursuant to the "California Test Procedures for 2026 and Subsequent Model Zero-Emission Vehicles and Plug-in Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as applicable**.**

7. Vehicle Fuel Tank Temperature Stabilization

7.1. Immediately after the hot transient exhaust emission test, the vehicle shall be soaked in a temperature-controlled area between one hour to six hours, until the fuel and, if applicable, vapor temperatures are stabilized at 105°F ± 3°F for one hour. This is a preparatory step for the running loss test. Cooling or heating of the fuel tank may be induced to bring the fuel to 105°F. The fuel heating rate shall not exceed 5°F in any 1-hour interval. Higher fuel heating rates are allowed with Executive Officer approval if the 5°F per hour heating rate is insufficient to heat the fuel to 105°F in the allowed soak time. The vehicle fuel temperature stabilization step may be omitted on vehicles whose tank fuel and, if applicable, vapor temperatures are already at 105°F upon completion of the exhaust emission test.

7.2. The vehicle air conditioning system (if so equipped) shall be set as described in 40 CFR §1066.835.

8. Running Loss Test

8.0. After the fuel temperature is stabilized at 105°F or at the temperature specified by the manufacturer, the running loss test shall be performed. During the test, the running loss measurement enclosure shall be maintained at 105°F ± 5°F maximum and within ± 2°F on average throughout the running loss test sequence. Control of the vapor temperature throughout the test to follow the vapor temperature profile generated according to the procedures in section III.C. is optional. In those instances where vapor temperature is not controlled to follow the profile, the measurement of the fuel tank pressure is not required, and sections III.D.8.1.10. and III.D.8.2.5. below shall not apply. In the event that a vehicle exceeds the applicable emission standard during confirmatory testing or in-use compliance testing, and the vapor temperature was not controlled, the manufacturer may, utilizing its own resources, test the vehicle to demonstrate if the excess emissions are attributable to inadequate control of vapor temperature. If the vehicle has more than one fuel tank, the fuel temperature in each tank shall follow the profile generated in section III.C. If a warning light or gauge indicates that the vehicle's engine coolant has overheated, the test run may be stopped.

8.1. If running loss testing is conducted using an enclosure which incorporates atmospheric sampling equipment, the manufacturer shall perform the following steps for each test:

8.1.1 The running loss enclosure shall be purged for several minutes immediately prior to the test. If at any time the concentration of hydrocarbons, of alcohol, or of alcohol and hydrocarbons exceeds 15,000 ppm C, the enclosure should be immediately purged. This concentration provides at least a 4:1 safety factor against the lean flammability limit.

8.1.2 Place the drive wheels of the vehicle on the dynamometer without starting the engine.

8.1.3 Attach the exhaust tube to the vehicle tailpipe(s).

8.1.4 The test vehicle windows and the luggage compartments shall be closed.

8.1.5 The fuel tank temperature sensor and the ambient temperature sensor shall be connected to the temperature recording system and, if required, to the air management and temperature controllers. The vehicle cooling fan shall be positioned as described in 40 CFR §86.135-90(b). During the running loss test, the cover of the vehicle engine compartment shall be closed as much as possible, windows shall be closed, and air conditioning system (if so equipped) shall be set as described in 40 CFR §1066.835. Vehicle coolant temperature shall be monitored to ensure adequate

vehicle coolant air to the radiator intake(s). The temperature recording system and the hydrocarbon and alcohol emission data recording system shall be started

8.1.6 Close and seal enclosure doors.

8.1.7 When the ambient temperature is 105°F ± 5°F, the running loss test shall begin. Analyze enclosure atmosphere for hydrocarbons and alcohol, if applicable, and record. This is the initial (time = 0 minutes) hydrocarbon concentration, C_{HCi}, and initial methanol concentration, if applicable, herein denoted as C_{CH3OHi}. The methanol sampling must start simultaneously with the initiation of the hydrocarbon analysis and continue for 4.0 ± 0.5 minutes. Record the time elapsed during this analysis. If the 4 minute sample period is inadequate to collect a sample of sufficient concentration to allow accurate Gas Chromatography analysis, rapidly collect the methanol sample in a bag and then bubble the bag sample through the impingers at the specified flow rate. The time elapsed between collection of the bag sample and flow through the impingers should be minimized to prevent any losses.

8.1.8 The vehicle shall be driven through one UDDS, then two NYCCs and followed by one UDDS. Each UDDS and the NYCC driving trace shall be verified to meet the speed tolerance requirements of 40 CFR §86.115-78 (b) as modified by III.C. The end of each UDDS cycle and the two NYCCs shall be followed by an idle period of 120 seconds during which the engine shall remain on with the vehicle in the same transmission range and clutch (if so equipped) actuation mode as specified in §86.128-79.

8.1.8.1 The fuel tank liquid temperature during the dynamometer drive shall be controlled within ± 3°F of the fuel tank temperature profile obtained on the road according to the procedures in section III.C. for the same vehicle platform/powertrain/fuel tank configuration. If applicable, the fuel tank vapor temperature throughout the running loss test shall agree with the corresponding vapor temperature with a tolerance of ± 5°F. A running loss test with a fuel tank vapor temperature that exceeded the corresponding vapor temperature profile by more than the ± 5°F tolerance may be considered valid if test results comply with the applicable running loss evaporative emission standards. In addition, the fuel tank vapor temperature during the final 120 second idle period shall agree with the corresponding vapor temperature from the on-road profile within ± 3°F. For testing conducted by the Executive Officer, vapor temperatures may be cooler than the specified tolerances without invalidating test results. The fuel tank temperatures shall be monitored at a frequency of at least once every 15 seconds.

8.1.9 For engine starting and restarting, the provisions of §86.136-90(a) and (e) shall apply. If the vehicle does not start after the manufacturer's recommended cranking time or 10 continuous seconds in the absence of a manufacturer's recommendation, cranking shall cease for the period recommended by the manufacturer or 10 seconds in the absence of a manufacturer's recommendation. This may be repeated for up to three start attempts. If the vehicle does not start after these three attempts, cranking shall cease and the reason for failure to start shall be determined. If the failure is caused by a vehicle malfunction, corrective action of less than 30 minutes duration may be taken (according to 40 CFR §86.1830-01), and the test continued, provided that the ambient conditions to which the vehicle is exposed are maintained at 105°F ± 5°F. When the engine starts, the timing sequence of the driving schedule shall begin. If the vehicle cannot be started, the test shall be voided.

8.1.10 Allowable tank pressure during the running loss test: Tank pressure shall not exceed 10 inches of water during the running loss test except as provided below.

If vehicle's tank pressure during running loss test exceeds 10 inches of water, Then the manufacturer must meet one of these requirements:
Demonstrate the incidents of the pressure exceeding 10 inches of water are transitory, not greater than 10 percent of the total driving time, and that the tank pressure does not exceed 10 inches of water during in-use operation.
Demonstrate in a separate test or an engineering evaluation that vapor would not be vented to the atmosphere if the fuel fill pipe cap was removed at the end of the test.

No pressure checks of the evaporative system shall be allowed. If the manufacturer suspects faulty or malfunctioning instrumentation, a repair of the test instrumentation may be performed. Under no circumstances will any changes/repairs to the evaporative emissions control system be allowed.

8.1.11 The FID hydrocarbon analyzer shall be zeroed and spanned immediately prior to the end of the test.

8.1.12 The running loss test ends with completion of the final 120 second idle that occurs 72 ± 2 minutes after the test begins. Analyze the enclosure atmosphere for hydrocarbons and for methanol, if applicable, at the end of the running loss test. These are reported as the sample hydrocarbon concentration, C_{HCf}, at the end of the test and the sample methanol concentration, C_{CH3OHf}, if applicable, at the end of the test. Record the elapsed time of this analysis.

8.1.13 Turn off the vehicle cooling fan and the vehicle underbody fan if used. The test vehicle windows and luggage compartment shall be opened. This is a preparatory step for the hot soak evaporative emission test.

8.1.14 The technician may now leave the enclosure through one of the enclosure doors. The enclosure door shall be open no longer than necessary for the technician to leave.

8.2. If running loss testing is conducted using a cell which incorporates point source sampling equipment, the manufacturer shall perform the following steps for each test:

8.2.1 The running loss test shall be conducted in a test cell meeting the specifications of 40 CFR §86.107-96(a)(1) as modified by these test procedures. Ambient temperature in the running loss test cell shall be maintained at 105 ± 5°F maximum and within ± 2°F on average throughout the running loss test sequence. The ambient test cell temperature shall

be measured in the vicinity of the vehicle cooling fan, and it shall be monitored at a frequency of at least once every 15 seconds. The vehicle running loss collection system and underbody cooling apparatus (if applicable) shall be positioned and connected. The vehicle shall be allowed to re-stabilize until the liquid fuel tank temperature is within ± 3.0°F of the initial liquid fuel temperature calculated according to 40 CFR §86.129-94, as amended by section III.C. of these test procedures, before the running loss test may proceed.

8.2.2 The vehicle cooling fan shall be positioned as described in 40 CFR §86.135-90(b). During the running loss test, the cover of the vehicle engine compartment shall be closed as much as possible, windows shall be closed, and air conditioning system (if so equipped) shall be set as described in 40 CFR §1066.835. Vehicle coolant temperature shall be monitored to ensure adequate vehicle coolant air to the radiator intake(s).

8.2.3 The vehicle shall be operated on the dynamometer over one UDDS, two NYCCs, and one UDDS. Each UDDS and NYCC driving trace shall be verified to meet the speed tolerance requirements of 40 CFR §86.115-78 (b) as modified by section III.C. Idle periods of 120 seconds shall be added to the end of each of the UDDS and to the end of the two NYCCs. The transmission may be operated according to the specifications of 40 CFR §86.128-79. Engine starting and restarting shall be conducted according to section III.D.8.1.9.

8.2.4 The fuel tank liquid temperature during the dynamometer drive shall be controlled within ± 3°F of the fuel tank liquid temperature profile obtained on the road according to the procedures in section III.C. (40 CFR §86.129-94 as amended by section III.C. of these test procedures) for the same vehicle platform/powertrain/fuel tank configuration. If applicable, the fuel tank vapor temperature throughout the running loss test shall agree with the corresponding vapor temperature with a tolerance of ± 5°F. A running loss test with a fuel tank vapor temperature that exceeded the corresponding vapor temperature profile by more than the ± 5°F tolerance may be considered valid if test results comply with the applicable running loss evaporative emission standards. In addition, the fuel tank vapor temperature during the final 120 second idle period shall agree with the corresponding vapor temperature from the on-road profile within ± 3°F. For testing conducted by the Executive Officer, vapor temperatures may be cooler than the specified tolerances without invalidating test results.

The fuel tank temperatures shall be monitored at a frequency of at least once every 15 seconds.

8.2.5 Allowable tank pressure during the running loss test: Tank pressure shall not exceed 10 inches of water during the running loss test except as provided below.

If vehicle's tank pressure during running loss test exceeds 10 inches of water, Then the manufacturer must meet one of these requirements:
Demonstrate the incidents of the pressure exceeding 10 inches of water are transitory, not greater than 10 percent of the total driving time, and that the tank pressure does not exceed 10 inches of water during in-use operation.
Demonstrate in a separate test or an engineering evaluation that vapor would not be vented to the atmosphere if the fuel fill pipe cap was removed at the end of the test.

No pressure checks of the evaporative system shall be allowed. If the manufacturer suspects faulty or malfunctioning instrumentation, a repair of the test instrumentation may be performed. Under no circumstances will any changes/repairs to the evaporative emissions control system be allowed.

8.2.6 After the test vehicle is positioned on the dynamometer, the running loss vapor collection system shall be properly positioned at the specified discrete emissions sources, which include vapor vents of the vehicle's fuel system, if not already positioned. The typical vapor vents for current fuel systems are the vents of the evaporative emission canister(s) and the tank pressure relief vent typically integrated into the fuel tank cap as depicted in Figure 1. Other designated places, if any, where fuel vapor can escape, shall also be included.

8.2.7 The running loss vapor collection system may be connected to the PDP-CVS or CFV bag collection system. Otherwise, running loss vapors shall be sampled continuously with analyzers meeting the requirements of §86.107-96(a)(2) as amended by section III.A. of these test procedures.

8.2.8 The temperature of the collection system until it enters the main dilution airstream shall be maintained between 175°F to 200°F throughout the test to prevent fuel vapor condensation.

8.2.9 The sample bags shall be analyzed within 20 minutes of their respective sample collection phases, as described in 40 CFR §86.137-94(b)(15).

8.2.10 After the completion of the final 120 seconds, turn off the vehicle cooling fan and the vehicle underbody fan if used.

8.3. Manufacturers may use an alternative running loss test procedure if it provides an equivalent demonstration of compliance. The use of an alternative procedure also requires the prior approval of the Executive Officer. The Executive Officer may conduct confirmatory testing or in-use compliance testing using either the running loss measurement enclosure incorporating atmospheric sampling equipment or in a test cell utilizing point source sampling equipment, as specified in 40 CFR §86.107-96(a)(2) as amended by section III.A. of these test procedures. The Executive Officer may perform the running loss test in either section III.D.8.1. or III.D.8.2. of this test procedure or using the manufacturer's approved alternative running loss test procedure for a specific evaporative family.

9. Hot Soak Test

9.1. §86.138-96. April 30, 2010. Amend as follows:

9.1.1 Subparagraphs (a) through (b) [No change.]

9.1.2 Amend subparagraph (b)(1) as follows: Reference to §86.134-96(g)(1)(xx) shall instead refer to section III.D.8.1.12. of these test procedures.

9.1.3 Subparagraphs (b)(2) through (b)(2)(v)(A) [No change.]

9.1.4 Amend subparagraph (b)(2)(v)(B) as follows: Reference to §86.143 shall instead refer to §86.143-96 as amended by section III.D.11. of these test procedures.

9.1.5 Subparagraphs (b)(2)(vi) to (d) [No change.]

9.1.6 Amend subparagraph (e) as follows: For the first 5 minutes of the hot soak test, the ambient temperature shall be maintained at 105±10°F. For the remainder of the hot soak test, the ambient temperature shall be maintained at 105±5°F (105±2 °F on average).

9.1.7 Subparagraphs (f) through (j) [No change.]

9.1.8 Amend subparagraph (j)(1) as follows: Analyze the enclosure atmosphere for hydrocarbons and record. This is the final (time = 60 minutes) hydrocarbon concentration, C_{HCf}, required in §86.143-96 as amended by section III.D.11. of these test procedures.

9.1.9 Amend subparagraph (j)(2) as follows: Reference to §86.143 shall instead refer to §86.143-96 as amended by section III.D.11. of these test procedures.

9.1.10 Amend subparagraph (k) to read as follows: For the supplemental two-diurnal test sequence (see section III.D.1. of these test procedures) perform a hot soak test as described in this section, except that the test shall be conducted within seven minutes after completion of the hot start exhaust test and temperatures throughout the hot soak measurement period must be between 68°F and 86°F. This hot soak test is followed by two consecutive diurnal heat builds, described in §86.133-96(p) as amended by section III.D.10. of these test procedures.

9.1.11 Amend subparagraph (l) to read as follows: If the vehicle is to be tested for diurnal emissions, follow the procedure outlined in §86.133-96 as amended by section III.D.10. of these test procedures.

10. Diurnal Emission Test

10.1. §86.133-96. August 23, 1995. Amend as follows:

10.1.1 Subparagraph (a) [No change.]

10.1.2 Amend subparagraph (a)(1) as follows: Emissions compliance shall be determined with standards specified in Part I.E. of these test procedures in lieu of subpart A of 40 CFR Part 86. Reference to §86.130-96 shall instead refer to section III.D.1. of these test procedures.

10.1.3 Amend subparagraph (a)(2) as follows: For the full three-diurnal test sequence, the diurnal emission test outlined in paragraphs (b) through (o) of §86.133-96 follows the high-temperature hot soak test concluded in §86.138-96(j) as amended by section III.D.9. of these test procedures.

10.1.4 Amend subparagraph (a)(3) as follows: For the supplemental two-diurnal test sequence, the diurnal emission test outlined in paragraph (p) of §86.133-96 follows the alternate hot soak test specified in §86.138-96(k) as amended by section III.D.9. of these test procedures. This test is not required for gaseous-fueled vehicles.

10.1.5 Amend subparagraph (b) as follows: Replace vehicle soak temperature of 72°±3 °F with 65°±3°F.

10.1.6 Amend subparagraph (c) as follows: The test vehicle shall be exposed to ambient temperatures cycled according to the profile specified below for each 24-hour cycle of the diurnal emission test:

Hour	0	1	2	3	4	5	6	7	8	9	10	11	12
(°F)	65.0	66.6	72.6	80.3	86.1	90.6	94.6	98.1	101.2	103.4	104.9	105.0	104.2
Hour	13	14	15	16	17	18	19	20	21	22	23	24	--
(°F)	101.1	95.3	88.8	84.4	80.8	77.8	75.3	72.0	70.0	68.2	66.5	65.0	--

10.1.7 Subparagraph (c)(1) [No change.]

10.1.8 Amend subparagraph (c)(2) as follows: Ambient temperatures shall be measured at least every minute. Temperature cycling shall begin when time = 0 minutes, as specified in paragraph (i)(5) of §86.133-96 as amended by section III.D.10. of these test procedures.

10.1.9 Subparagraphs (d) through (i)(4) [No change.]

10.1.10 Amend subparagraph (i)(5) as follows: Reference to §86.143 shall instead refer to §86.143-96 as amended by section III.D.11. of these test procedures.

10.1.11 Amend subparagraph (i)(6) as follows: Reference to §86.143 shall instead refer to §86.143-96 as amended by section III.D.11. of these test procedures.

10.1.12 Subparagraphs (j) through (l) [No change.]

10.1.13 Amend subparagraph (m) as follows: The end of the first, second, and third emission sampling period shall occur 1440±6, 2880±6, 4320±6 minutes, respectively, after the beginning of the initial sampling, as specified in paragraph (i)(5) of §86.133-96 as amended by section III.D.10. of these test procedures.

10.1.14 Amend subparagraph (m)(1) as follows: Reference to §86.143 shall instead refer to §86.143-96 as amended by section III.D.11. of these test procedures.

10.1.15 Amend subparagraph (m)(2) as follows: Reference to §86.143 shall instead refer to §86.143-96 as amended by section III.D.11. of these test procedures.

10.1.16 Subparagraph (n) [No change.]

10.1.17 Amend subparagraph (o) to read as follows: This completes the full three-diurnal evaporative emission test sequence described in section III.D.1. of these test procedures.

10.1.18 Amend subparagraph (p) to read as follows: For the supplemental two-diurnal test sequence described in section III.D.1. of these test procedures, the following steps shall be performed in lieu of the steps described in paragraphs (b) through (n) of §86.133-96 as amended by section III.D.10. of these test procedures.

10.1.19 Amend subparagraph (p)(1) as follows: For the supplemental two-diurnal test sequence, the test vehicle shall be soaked for not less than 6 hours nor more than 36 hours between the end of the hot soak test described in §86.138-96(k), as amended by section III.D.9. of these test procedures, and the start of the two-diurnal emission test. For at least the last 6 hours of this period, the vehicle shall be soaked at 65±3°F.

10.1.20 Amend subparagraph (p)(2) as follows: The vehicle shall be tested for diurnal emissions according to the procedures specified in paragraphs (c) through (n) of §86.133-96 as amended by section III.D.10. of these test procedures, except that the test includes only two 24-hour periods. Therefore, the end of the first and second emission sampling periods shall occur 1440±6 and 2880±6 minutes, respectively, after the initial sampling.

10.1.21 Subparagraph (p)(3) [No change.]

10.1.22 Add subparagraph (q) to read: In order to determine that the working capacity of the canister is sufficient to store the hydrocarbon vapor generated over the manufacturer specified number of days between auxiliary power unit activation events for the purposes of purging the evaporative canister, the evaporative canister shall be weighed after completion of the three-day diurnal period. The weight of the vapor contained in the canister shall not exceed the working capacity of the canister multiplied by three days and divided by the manufacturer specified number of days between auxiliary power unit activation events.

11. Calculations: Evaporative Emissions

11.1. §86.143-96. October 25, 2016. Amend as follows:

11.1.1 Subparagraphs (a) through (b)(1)(iii) ([No change.]

11.1.2 Add subparagraph (b)(1)(iii) as follows: For variable-volume enclosures, defined in §86.107(a)(1)(i), the following full form of the hydrocarbon mass change equation may be used:

$$M_{HC} = (k \times 10^{-4}) \times \left[\left(\frac{(C_{HCf} - rC_{CH3OHf})P_{Bf}V_f}{T_f}\right) - \left(\frac{(C_{HCi} - rC_{CH3OHi})P_{Bi}V_i}{T_i}\right)\right]$$

Where:

M_{HC} = Hydrocarbon mass change, g.

C_{HC} = FID hydrocarbon concentration as ppm carbon, that is, ppm propane × 3, including FID response to methanol in the sample.

C_{HC3OH} = Methanol concentration as ppm carbon.

r = FID response factor to methanol.

k = 3.05

V = Measured enclosure volume ft^3 as determined by subtracting 50 ft^3 (volume of vehicle with trunk and windows open) from the measured enclosure volume. For calibration tests when no vehicle is in the enclosure, do not subtract 50 ft^3 from the measured enclosure volume. A manufacturer may use the measured volume of the vehicle (instead of the nominal 50 ft^3) with advance approval by the Executive Officer, provided the measured vehicle volume is determined and used for all vehicles tested by that manufacturer:

V = Measured volume – 50 ft^3.

[Note: V as measured by enclosure volume measuring system, see §86.117-96(b)(1) as amended by section III.B. of these test procedures.]

P_B = Barometric pressure, in-Hg (Enclosure pressure, in-Hg, may be substituted for barometric pressure).

T = Enclosure ambient temperature, °R.

i = Indicates initial reading.

f = Indicates final reading.

11.1.3 Subparagraphs (b)(2) through (d)(1)(i) ([No change.]

11.1.4 Amend subparagraph (d)(1)(ii) as follows: The adjusted total mass emissions for the running loss test, on a grams per mile basis = M_{RL}/D_{RL}, where D_{RL}= miles driven for the running loss test (see section III.D.8. of these test procedures).

11.1.5 Amend subparagraph (d)(2) as follows: For the supplemental two-diurnal test sequence, there is one final result to report: the sum of the adjusted total mass emissions for the diurnal and hot soak tests ($M_{DI} + M_{HS}$), described in §86.133-96(p) and §86.138-96(k), as amended by section III.D.9. of these test procedures, respectively.

12. Bleed Emission Test Procedure (BETP)

12.1. Carbon Canister System Stabilization. The carbon canister system shall be stabilized to a 4,000-mile test condition using one of the following methods:

12.1.1 Stabilization on a vehicle. The canister system shall be installed on a representative vehicle, and the vehicle shall be driven for 4,000 miles using the gasoline set forth in part II., section A.3 of the "California 2026 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles." The last part of this drive shall consist of an Urban Dynamometer Driving Schedule (UDDS), specified in appendix I of 40 CFR Part 86.

12.1.2 Carbon Canister System Purge/Load Cycling with Fuel Vapor. The carbon canister system shall be cycle aged no less than 10 cycles using the gasoline referenced in section III.D.12.1.1 by loading the canister system to 2-gram breakthrough with either a mixture of fuel vapor and nitrogen (50 ± 15 percent fuel vapor by volume) or a mixture of fuel vapor and air (50 ± 15 percent fuel vapor by volume), at a fuel vapor fill rate of

40 to 80 grams per hour. Each loading is followed by purging the canister system with 300 canister bed volume exchanges at 0.8 cfm.

12.1.3 Alternative Carbon Canister System Purge/Load Cycling with Fuel Vapor. The carbon canister system shall be aged no less than 10 cycles using the gasoline referenced in section III.D.12.1.1 by loading and purging the carbon canister system with a method approved in advance by the Executive Officer. The alternative method shall be demonstrated to yield test results equivalent to or more stringent than, those resulting from the use of the method set forth in section III.D.12.1.1 or III.D.12.1.2.

12.2. Fuel Tank Drain/Fill and Soak. A fuel tank that represents the worst case as determined by engineering evaluation shall be drained and filled to 40 percent with the gasoline referenced in section III.D.12.1.1. The tank shall be soaked for a minimum of 6 hours to a maximum of 72 hours at 65 ± 3°F. The canister system load (section III.D.12.3) and soak (section III.D.12.4) can be performed in series or in parallel with the 6 to 72 hour fuel tank soak.

12.3. Carbon Canister System Loading. The canister system shall be loaded according to the canister loading procedure in the supplemental two-day diurnal sequence, as specified in sections III.D.3.3.5. through III.D.3.3.5.1.2. This procedure requires loading the canister with a 50/50 mixture by volume of butane and nitrogen at a rate of 40 grams butane per hour to a 2-gram breakthrough.

12.4. Carbon Canister System Soak. The canister system shall then be soaked for a minimum of 1 hour.

12.5. Carbon Canister System Purge. The carbon canister system shall be purged using one of the following methods:

12.5.1 The canister system shall be attached to a vehicle and driven on the drive cycle of the supplemental two-day diurnal sequence, as specified in section III.D.6., to purge the canister system.

12.5.2 Alternatively, the canister system may be purged at a rate and volume in a laboratory simulation, based on an engineering evaluation, to represent the net mass of hydrocarbons desorbed from the canister system during the drive cycle of the supplemental two-day diurnal sequence, as specified in section III.D.6.

12.6. Connection of Carbon Canister System and Fuel Tank. The canister system load port shall be connected to the fuel tank vent port of the otherwise sealed fuel tank and soaked for a minimum of 12 hours and a maximum of 36 hours at 65 ± 3°F. The canister system purge (engine) port shall be plugged for the remainder of the bleed emissions test.

12.7. Two-Day Diurnal Temperature Cycling. The fuel tank and canister system shall be cycled between 65°F and 105°F according to the two-day diurnal test in section III.D.10.15.

12.7.1 If using Method A (section III.D.12.8.1.) for the hydrocarbon capture method, temperature cycling, and hydrocarbon capture shall occur in an environmental chamber. This chamber shall provide air circulation over the fuel tank as described in 40 CFR 86.107-96(d)(3). Also, chamber temperature shall be measured and controlled as described in 40 CFR §86.107-98(e)(1), except the wall thermocouples shall be approximately level with the fuel tank, and the fuel tank thermocouple shall measure the air within 10 inches of the exposed portion of the fuel tank. In addition, the chamber shall be insulated to enable the test temperature profile to be achieved with a heating/cooling system which has surface temperatures in the enclosure no less than 25.0°F below the minimum diurnal temperature specification.

12.7.2 If using Method B (section III.D.12.8.2.) for the hydrocarbon capture method, temperature cycling, and hydrocarbon capture shall occur in a diurnal evaporative emission measurement enclosure. An enclosure as described in 40 CFR 86.107-96(a)(1) as amended by section III.A. of these test procedures shall be used, except that thermocouples shall be arranged per section III.D.12.7.1. and the enclosure shall be of sufficient size to contain the fuel tank and canister system.

12.7.3 If using Method C (section III.D.12.8.3.) for the hydrocarbon capture method, temperature cycling, and hydrocarbon capture shall occur either in an environmental chamber as described in section III.D.12.7.1 or in a diurnal evaporative emission measurement enclosure as described in section III.D.12.7.2.

12.8. Hydrocarbon Capture Methods. Either Method A, Method B, or Method C shall be used to capture the hydrocarbon emissions from the carbon canister.

12.8.1 Method A. A Tedlar or equivalent bag of sufficient size to be able to capture the volume of air coming from the canister system during the diurnal shall be attached to the air tube of the test canister system. The bag shall be such a size as to not cause back pressure in the canister and impede vapor flow from the canister. This bag shall stay attached until the fuel reaches peak temperature (approximately 12 hours into the diurnal cycle). Each sample bag shall be analyzed as described in section III.D.12.9.1. within 20 minutes of the sample collection. During the cooling back to the minimum temperature, the air tube can be left open or connected to a new Tedlar or equivalent bag with a sufficient amount of zero air in it to allow air to pass back and forth through the canister system and bag, while not allowing pressure/vacuum to occur in the canister. If air tube is left open, a new Tedlar or equivalent bag shall be attached to the air tube at minimum fuel temperature (approximately 24 hours into the diurnal cycle). This step shall be repeated for each 24-hour diurnal period.

12.8.2 Method B. The outlet of the test canister system shall be open to the diurnal evaporative emission measurement enclosure, as described in 40 CFR 86.107-96(a)(1) as amended by section III.A. of these test procedures, to measure hydrocarbon emissions. The pressure inside the enclosure shall not impede or assist flow through the canister system. This enclosure shall be sized appropriately to achieve a minimum resolution of ± 5 mg at a total hydrocarbon concentration of 10 mg/total enclosure volume.

12.8.3 Method C. The canister emissions shall be continuously analyzed using a FID and integrated with continuous flow measurements to provide the mass of hydrocarbon emissions from the canister for each 24-hour diurnal period. Method C may be used subject to advance approval by the Executive Officer. Approval would require proof that all canister emissions are routed to the FID and that pressure inside the enclosure does not impede or assist flow through the canister system.

12.9. Hydrocarbon Mass Determination. There is no requirement to separately measure for alcohol emissions in this bleed emission test**.**

12.9.1 If using Method A (section III.D.12.8.1.) for the hydrocarbon capture method, the FID hydrocarbon analyzer shall be zeroed and spanned

coinciding with each sample per 40 CFR §86.140-94. The removed bags shall be filled to a constant volume with Zero Air and evacuated into a FID through a sample pump to determine the concentration of hydrocarbons. The hydrocarbon mass for each 24-hour period shall then be calculated using the following equation:

$M_{HC}=16.88 \times V_{BAG} \times C_{HC} \times 10^{-6}$

where:

M_{HC} is the diurnal hydrocarbon mass emissions (grams)

16.88 is the density of pure vapor @ 68º F (grams/ft^3)

V_{BAG} is the total volume of sample gas in the sample bag (std. ft^3)

C_{HC} is the sample bag hydrocarbon concentration (ppm C)

12.9.2 If using Method B (section III.D.12.8.2.) for the hydrocarbon capture method, the FID hydrocarbon analyzer shall be zeroed and spanned coinciding with each sample per 40 CFR §86.140-94. The hydrocarbon emissions will be monitored by taking a minimum of 5 measurements, at hours 0, 12, 24, 36, and 48 of the two-day diurnal cycles. The mass of hydrocarbon emissions for each 24-hour period shall be determined and is equal to the maximum hydrocarbon mass value for each 24-hour period. This maximum hydrocarbon mass value is obtained by calculating and comparing the hydrocarbon mass values at each of the measurement time-points for each 24-hour period. The hydrocarbon mass value is defined as:

$M_{HC}=[2.97 \times 10^{-4} \times\{(P_x \times V_x \times C_{HCx})/T_x - (P_i \times V_i \times C_{HCi})/T_i\}] + M_{HC,\,out} - M_{HC,\,in}$

where, for fixed volume enclosures:

M_{HC} is the diurnal hydrocarbon mass emissions (grams)

P_i is the initial barometric pressure (inches Hg)

P_x is the barometric pressure during the diurnal at time of hydrocarbon measurement (inches Hg)

V_i is the initial enclosure volume (ft^3)

V_x is the enclosure volume during the diurnal at time of hydrocarbon measurement (ft^3)

C_{HCi} is the initial enclosure hydrocarbon concentration (ppm C)

C_{HCx} is the enclosure hydrocarbon concentration during the diurnal at time of hydrocarbon measurement (ppm C)

T_i is the initial enclosure temperature (º R)

T_x is the enclosure temperature during the diurnal at time of hydrocarbon measurement (º R)

$M_{HC,\ out}$ is the mass of hydrocarbon exiting the enclosure from cycle start to time of hydrocarbon measurement (grams)

$M_{HC,\ in}$ is the mass of hydrocarbon entering the enclosure from cycle start to time of hydrocarbon measurement (grams)

The measurements at the end of the first 24-hour period become the initial conditions of the next 24-hour period. For variable volume enclosures, calculate the hydrocarbon mass (M_{HC}) according to the equation used above except that $M_{HC,\ out}$ and $M_{HC,\ in}$ shall equal zero.

12.10. The final reported result shall be the highest 24-hour diurnal hydrocarbon mass emissions value out of the two 24-hour cycles.

13. Effective Leak Diameter Test

13.1. To be conducted according to 40 CFR §1066.985.

14. Minimum canister size calculation for selected vehicles:

14.1. Applies to vehicles that have a tank pressure which exceeds 10 inches of water during the running loss test.

14.2. Min Canister nominal working capacity (grams) =

$$1.2 \times 1.3 \times [5.8 \times 14.7/P_{tvs} \times ((P_{tvs} \times V_{tvs})/14.7 - V_{tvs}) + G_{refuel} \times 0.88 \times V_{fuelcap}]$$

where:

- Nominal working capacity as defined in III.D.3.3.4
- V_{tvs} is vapor space volume. This is 90% of the total geometric volume of the fuel tank. Geometric volume is the sum of the fuel tank capacity and vapor space. (gallons)
- $V_{fuelcap}$ is the nominal fuel tank capacity, which means the volume of the fuel tank(s), specified by the manufacturer to the nearest tenth of a U.S. gallon, which may be filled with fuel from the fuel tank filler inlet. (gallons)

- G_{refuel} is the vapor generation during refueling (grams/gallon)
    - Use 5 grams/gallon as default
    - Manufacturer has the option to use a custom value for G_{refuel} which represents the refueling vapor generation in the fuel tank of their particular vehicle.
- P_{tvs} is fuel tank's maximum pressure in-use (absolute pressure in psi) Pressure to use for $P_{tvs;}$

  A default value of 19 psia is presumed to be a typical maximum tank pressure and shall be used for this calculation except as follows:

  A) If the actual maximum pressure in the tank is higher than the default value at any time during charge-sustaining operation (for plug-in hybrid electric vehicles) or during normal operation (for hybrid or conventional vehicles), the actual maximum pressure shall be used in the calculation.

  B) If the manufacturer demonstrates that the actual maximum pressure in the tank is lower than default value, under all operating conditions (e.g., charge-depleting and charge-sustaining operation for plug-in hybrid electric vehicles), the actual maximum pressure may be used in the calculation in lieu of the default value.

  For purposes of this requirement to determine actual maximum pressure, manufacturers shall only be required to verify the maximum pressure that occurs when conducting the running loss fuel tank temperature profile sequence in accordance with section III.C (e.g., 105°F fuel and ambient temperature, UDDS and NYCC driving cycles), except reference this section III.D.14 for determining state of charge.

Reporting requirements for manufacturer at certification:

- Indicate how V_{tvs}, $P_{tvs,}$ and G_{refuel} were determined. If a custom value was used for any of these, then provide supporting data demonstrating the appropriateness of the value(s) selected.
- A clear description of what conditions trigger the fuel tank

pressure to be relieved.

E. Liquefied Petroleum Gas-fueled Vehicles

1. For LPG-fueled motor vehicles, the introduction of 40 percent by volume of chilled fuel and the heating of the fuel tank under the diurnal part of the evaporative test procedures shall be eliminated.
2. Calculation of LPG Emissions. The evaporative emissions for LPG systems shall be calculated in accordance with 40 CFR §86.143-96 except that a H/C ratio of 2.658 shall be used for both the diurnal and hot soak emissions.

F. Fuel Specifications

1. All gasoline-fueled motor vehicles shall be tested for evaporative emissions on the gasoline set forth in part II., section A.3. of the "California 2026 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles"; evaporative emission testing by the Executive Officer will be performed using said test fuel.
2. For all motor vehicles other than gasoline-fueled vehicles (except for flexible fuel vehicles certifying to evaporative emission standards set forth in the section I.E.1.(d), as noted below), the evaporative emission test fuel shall be the applicable fuel specified for evaporative emission testing in part II. section A.3 of the "California 2026 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles."

G. Alternative Test Procedures

1. For vehicles that are required to be certified using California gasoline test fuel, a manufacturer may alternatively demonstrate compliance with the applicable evaporative emission standards using a gasoline test fuel meeting the specifications set forth in 40 CFR §1065.710(b) if the manufacturer also uses the evaporative emission test procedures set forth in 40 CFR §86.107-96 through 86.143-96 in place of the test procedures set forth in these test procedures.

   1.1. If gasoline test fuel meeting the specifications set forth in 40 CFR §1065.710(b) is used in the Bleed Emission Test Procedure (BETP), then both the fuel tank soak set forth in section III.D.12.2 and the fuel tank/canister assembly soak set forth in section III.D.12.6 shall occur at 72 ± 3°F, and the diurnal temperature profile shall be as specified in 40 CFR Appendix II. Otherwise, the BETP procedure, as specified in these test procedures, shall be used.

2. Manufacturers may use an alternative set of test procedures to demonstrate compliance with the standards set forth in section I.E. of these test procedures with advance Executive Officer approval if the alternative procedure is demonstrated to yield test results equivalent to, or more stringent than, those resulting from the use of the test procedures set forth in section III.D. of these test procedures.
3. If the manufacturer uses for certification a test procedure other than section III.D., the Executive Officer has the option to conduct confirmatory and in-use compliance testing with the test procedures set forth in section III.D. of this California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles.

H. Use of Comparable Federal Requirements for Carry-across Specifications and Road Profile Correction Factors

1. Upon prior written approval of the Executive Officer, a manufacturer may use the comparable federal requirements in Title 40, CFR, Part 86 in lieu of the carry-across specifications of section II.A. of these test procedures and the running loss road profile correction factors of section III.C. The Executive Officer shall approve a manufacturer's request if the manufacturer demonstrates to the Executive Officer that the alternative methodology will not adversely affect in-use evaporative emissions.

I. Figures illustrating the evaporative emission test procedures
The figures in this Part IV are for illustrative purposes only. If any discrepancies exist between the language in Part III and the figures in this Part IV, the requirements in Part III shall apply.

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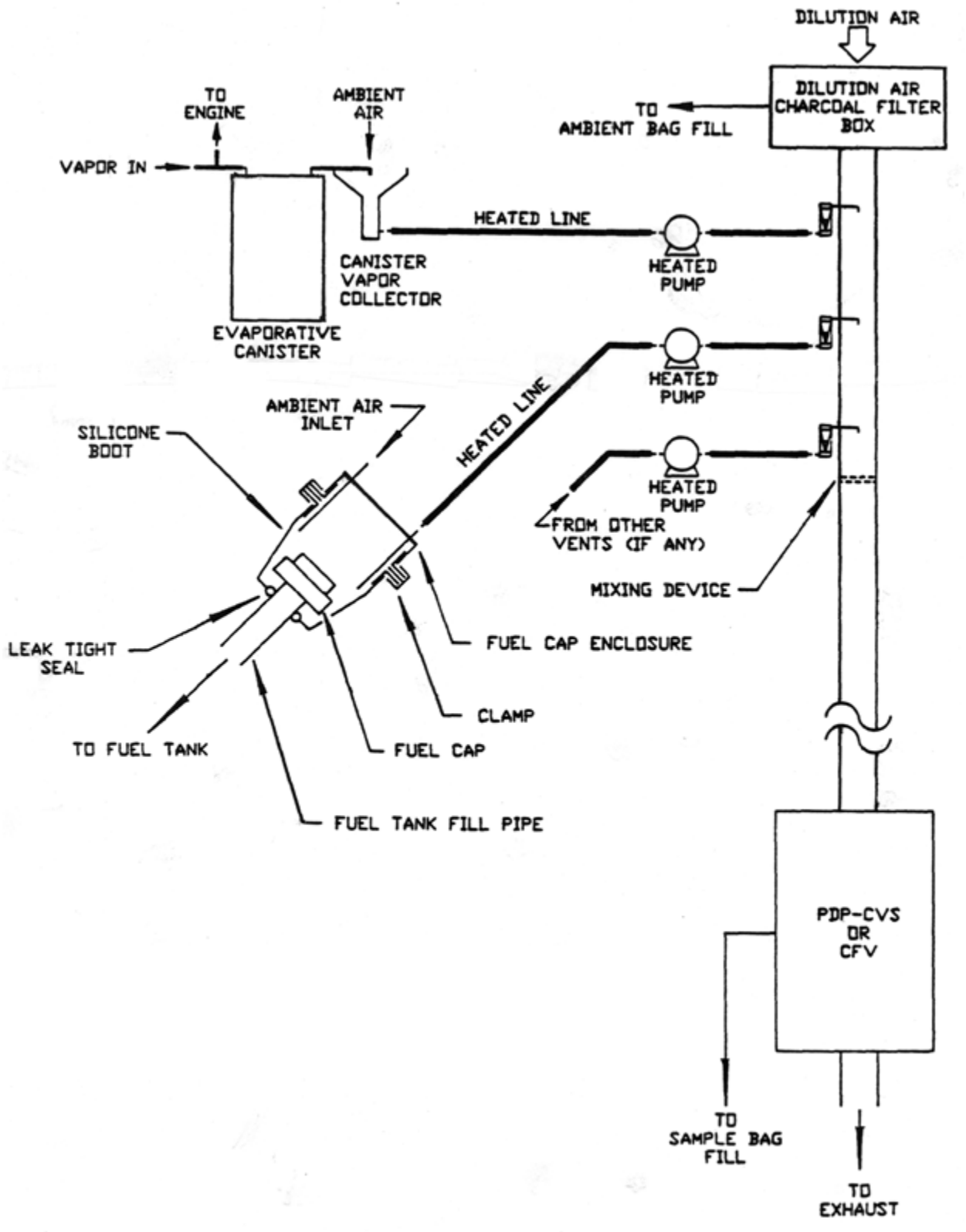

Figure 1: Running Loss Vapor Vent Collection System

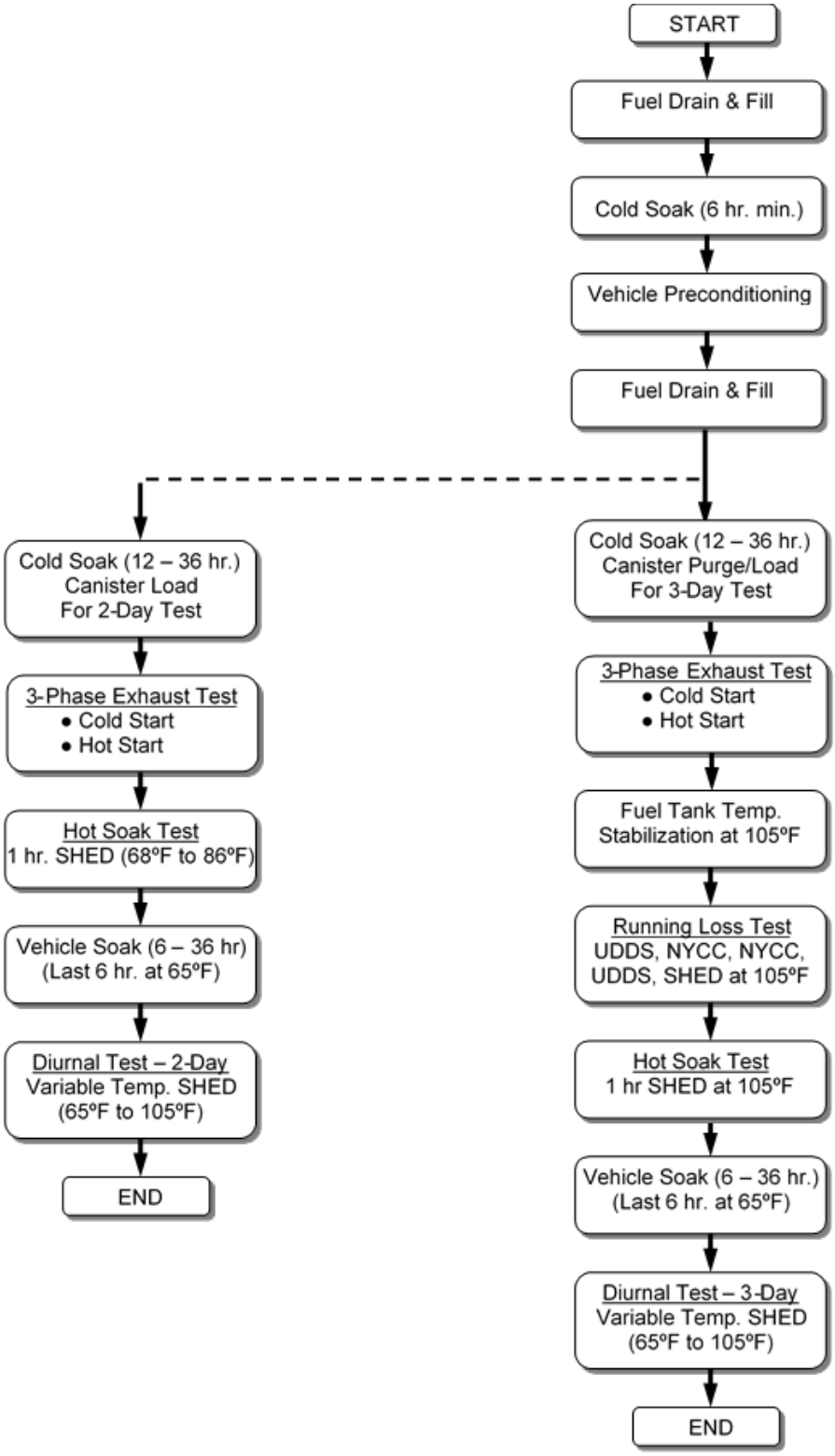

Figure 2: Test Procedure for 2001 and Subsequent Model Motor Vehicles

Date of Release: April 12, 2022
Date of Hearing: June 9, 2022

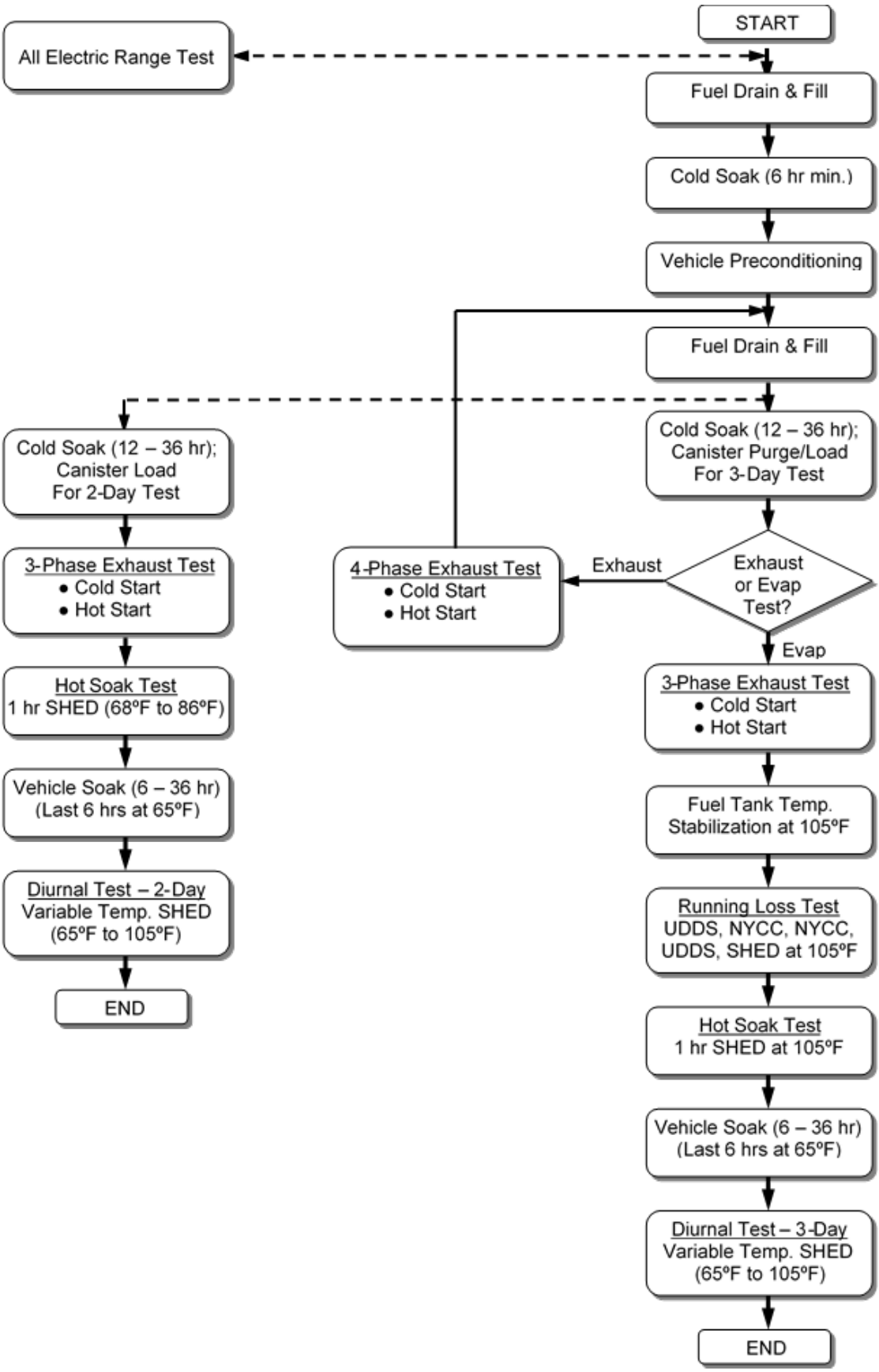

Figure 3A: Test Procedure for 2001 and Subsequent Model Hybrid Electric Vehicles

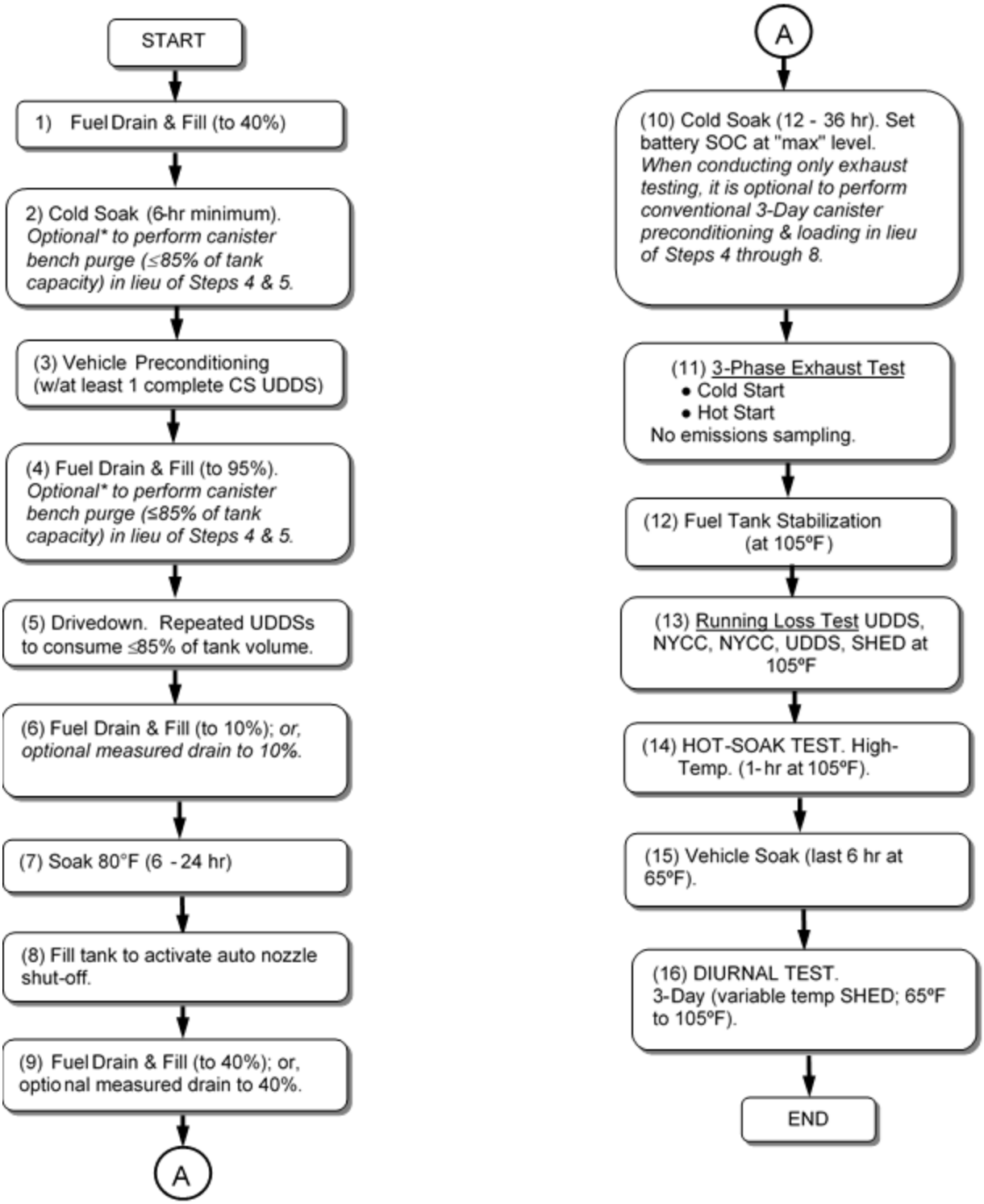

Figure 4: 3-day Test Procedure for Off-vehicle Charge Capable Hybrid Electric Vehicles with Non-Integrated Refueling Canister-Only System