

Draft Proposed Test Procedures

CALIFORNIA TEST PROCEDURES FOR 2026 AND SUBSEQUENT MODEL YEAR ZERO-EMISSION VEHICLES AND PLUG-IN HYBRID ELECTRIC VEHICLES, IN THE PASSENGER CAR, LIGHT-DUTY TRUCK AND MEDIUM-DUTY VEHICLE CLASSES

Adopted: [Insert Adoption Date]

[Note: This version is a staff draft, not an authoritative version for this proposed rulemaking, not being proposed for adoption, and not being released for public comment. This is subject to change. Official proposed (15-day) changes and an explanatory notice will be released for public comment at a later date.

Subsections for which no changes are proposed in this rulemaking are indicated with ["* * * *."]]

* * * *

A. Applicability.

1. The test procedures in this document are applicable to 2026 and subsequent model year zero-emission passenger cars and light-duty trucks (zero-emission vehicle or ZEV), and 2026 and subsequent model year plug-in hybrid electric passenger cars, light-duty trucks, and medium-duty vehicles. The test procedures in this document may optionally be used by manufacturers for testing of 2026 and subsequent model year zero-emission medium-duty vehicles.

* * * *

B. Definitions and Terminology

1. Definitions.

* * * *

“Battery” or “battery pack” or “high voltage battery pack” or “traction battery” means any electrical energy storage device consisting of any number of individual battery modules or cells that is used to supply power to propel a zero-emission vehicle, or plug-in hybrid electric vehicle. These terms also generically refer to capacitor and flywheel energy storage devices used to supply power for propulsion of the vehicle.

“Battery state-of-charge (SOC)” means the remaining level of charge in the battery relative to the maximum level of charge of the battery expressed in percent. This term also generically refers to the state-of-charge for other energy storage devices such as a capacitor or flywheel in lieu of or in addition to a battery.

* * * *

C. Test Procedures for 2026 and Subsequent Model Year Zero-Emission Vehicles

* * * *

4. SAE J2572 Test Procedures.

4.1. FCEVs shall be tested utilizing SAE J2572 test procedures except as noted:

4.2. For the calculation of usable fuel amount in SAE J2572, manufacturers shall utilize the definition of Run-Out in these test procedures when determining the unusable fuel amount.

4.3. For plug-in FCEVs, manufacturers shall propose a method prior to certification for Executive Officer approval to determine urban and highway ranges and energy consumption in accordance with sections D and E of this test procedure, as appropriate. Such a proposal shall be submitted to the Executive Officer at least 90 days prior to submittal of a certification application for the vehicle. The Executive Officer shall approve the proposed method in writing within 60 days upon finding the approach uses good engineering judgment to adjust the test procedures to determine ranges and energy consumption separately attributable to off-board electricity and hydrogen fuel with equivalent accuracy and precision as the test procedures generate for BEVs or FCEVs.

* * * *

8. Application of Good Engineering Judgment

The provisions of Title 40, Code of Federal Regulations, § 86.1851-01, Application of good engineering judgment to manufacturers' decisions, as of [INSERT DATE OF ADOPTION], are incorporated by reference except that section 86.1851-01(f) is amended as follows:

(f) Within 30 working days following receipt of notification of the Executive Officer's determinations made under paragraph (d) of this section, the manufacturer may request a hearing on those determinations. The request shall be in writing, signed by an authorized representative of the manufacturer, and shall include a statement specifying the manufacturer's objections to the Executive Officer's determinations, and data or other analysis in support of such objections. If, after review of the request and supporting data or analysis, the Executive Officer finds that the request raises a substantial factual issue, they shall provide the manufacturer a hearing in accordance with the process for appeals of Executive Officer decisions in Cal. Code Regs., tit. 17, Art. 2, Administrative Hearing Procedures for Petitions for Review of Executive Officer Decisions, section 60055.1, et seq., with respect to such issue.

* * * *

E. Test Procedures For 2026 And Subsequent Model Plug-In Hybrid Electric Vehicles.

Background.

The "as adopted or amended dates" of the 40 CFR Part 1066 regulations referenced by this document are the dates identified 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. Test Equipment and Recording Requirements.

1.1. Dynamometer Equipment for Testing.

All vehicles must be tested using an electric dynamometer meeting the requirements of 40 CFR Part 1066 Subpart C.

1.2. Data Recording Requirements.

The following data shall be recorded for all tests and for each individual test cycle therein, except for the 20°F and 50°F tests, conducted in accordance with section E.8:

- (a) mileage accumulated during the All-Electric Range portion of the test, where applicable;
- (b) Net DC energy from the battery that was expended during the test (may be reported as the total DC battery energy output and the total DC battery energy input);
- (c) AC energy required to fully charge the battery after a charge depleting or charge sustaining test from the point where electricity is introduced from the electric outlet to the battery charger;
- (d) Net DC amp·hr from the battery that was expended during the test (may be reported as the total DC amp·hr output and the total DC amp·hr input); and
- (e) Measured AC and DC watt hours and amp hours shall be reported to the nearest hundredth of a kilowatt hour and tenth of an amp hour.

1.3. Measurements Accuracy.

The overall error in voltage and current recording instruments shall be NIST traceable with an accuracy as specified in 40 CFR §1066.501 subparagraph (a)(2)(iv) [February 19, 2015]. Instruments measuring voltage and current shall be as specified in 40 CFR §1066.501 subparagraph (a)(4) [February 19, 2015].

Alternative measurement methods may be used if shown to yield equivalent results and if approved in advance by the Executive Officer under the procedure outlined in E.3.2.1. The manufacturer must provide information to demonstrate measurement equivalency between the alternative measurement method and the method outlined in this subsection E.1.3.

* * * *

2. All-Electric Range Testing.

2.1. Provision for Use of Alternative Procedures

Alternative procedures may be used for all-electric range testing if shown to yield equivalent results and if approved in advance by the Executive Officer under the procedure in subsection E.3.2.1. The manufacturer must provide information that demonstrates the all-electric range measured by the alternative test procedure is equivalent to the all-electric range measured by the applicable method outlined in this section E.2.

2.2. Driver Selectable Mode for Range Testing.

A vehicle shall be range tested in default mode or in normal mode if the vehicle does not have a default mode for the purpose of determining: Urban All-Electric Range and Urban Equivalent All-Electric Range in accordance with section E.2.4; Highway All-Electric Range and Highway Equivalent All-Electric Range in accordance with section E.2.5; and US06 all electric range capability in accordance with section E.2.6.

2.3. Regenerative Braking.

Regenerative braking systems may be utilized during the range test. The braking level, if adjustable, shall be set according to the manufacturer's specifications for normal driving conditions prior to the commencement of the test. The driving schedule speed and time tolerances specified in 40 CFR §1066.425 shall not be exceeded due to the operation of the regenerative braking system.

2.4. Urban All-Electric Range.

2.4.1. Urban All-Electric Range Definition.

The Urban All-Electric Range shall be defined as the distance that the vehicle is driven from the start of Urban Charge-Depleting Emission Test until the engine first starts in accordance with section E.4.3.2.1. Record the SOC when the engine first starts. The Urban Charge-Depleting Emission Test is performed with the vehicle initially at full state-of-charge. When emission testing a vehicle in a driver-selectable mode other than default mode or normal mode, the distance of the Urban All-Electric Range, which occurs during the first portion of the Urban Charge-Depleting Emission Test, shall not be considered as certification urban all-electric range for the purposes of compliance with the requirements in section E of "Zero-Emission Vehicle Requirements for 2026 and Subsequent Model Year Passenger Cars and Light-Duty Trucks".

2.4.2. Cold Soak and Vehicle Charging

The vehicle shall be stored at an ambient temperature not less than 68°F (20°C) and not more than 86°F (30°C) for 12 to 36 hours. During this time, the vehicle battery shall be charged to a full state-of-charge. The vehicle must be turned off during charging. Charge time shall not exceed soak time.

2.4.3. Urban Equivalent All-Electric Range Calculation.

Urban Equivalent All-Electric Range shall be calculated in accordance with section E.11.

2.5. Highway All-Electric Range.

2.5.1. Highway All-Electric Range Definition.

The Highway All-Electric Range shall be defined as the distance that the vehicle is driven from the start of the Highway All-Electric Range Test until the engine first starts. The Highway All-Electric Range Test is performed with the vehicle initially at full state-of-charge.

2.5.2. Cold Soak and Vehicle Charging

The vehicle shall be stored at an ambient temperature not less than 68°F (20°C) and not more than 86°F (30°C) for 12 to 36 hours. During this time, the vehicle battery shall be charged to a full state-of-charge. The vehicle must be turned off during charging. Charge time shall not exceed soak time.

2.5.3. Highway Charge Depleting All-Electric Range Test.

Starting at full state-of-charge, the vehicle shall be placed or pushed, onto a dynamometer and operated through the Continuous Highway Test Schedule until the SOC Net Energy Change Tolerances (specified in section E.10 of these test procedures) indicate charge sustaining operation are met for one HFEDS cycle. Additional Alternative End-of-Test Criteria as provided for in the Urban Charge-Depleting Emission Test in sections E.4.3.4.1 and E.4.3.4.2 may be used for the Highway Charge-Depleting Range Test with approval from the Executive Officer under the procedure outlined in subsection E.3.2.2.

Emissions shall be measured for all test cycles when the engine is operating. For each test cycle during which emissions are not generated, emissions are not required to be sampled. However, the manufacturer must validate that the engine did not turn on at any time during the test cycle.

The Alternative Continuous Highway Test Schedule may be substituted for the Continuous Highway Test Schedule if the test facility is unable to perform the Continuous Highway Test Schedule.

2.5.4. Vehicle Charging after the Highway Charge Depleting All-Electric Range Test.

Vehicle charging shall begin within three hours after the Highway Charge Depleting Range Test and the vehicle shall be charged to the manufacturer specified full state-of-charge. During charging, all applicable requirements in section E.1 must be met, and energy consumption shall be calculated according to the requirements in section E.11.2.

2.5.5. Highway Equivalent All-Electric Range Calculation.

Equivalent All-Electric Range shall be calculated in accordance with section E.11.

2.6. US06 All-Electric Range.

2.6.1. US06 All-Electric Range Definition.

The US06 All-Electric Range shall be defined as the distance that the vehicle is driven from the start of the US06 All-Electric Range Test until the end-of-test criteria in section E.2.6.3 are met. The US06 All-Electric Range Test is performed with the vehicle initially at full state-of-charge.

2.6.2. Cold Soak and Vehicle Charging.

The vehicle shall be stored at an ambient temperature not less than 68°F (20°C) and not more than 86°F (30°C) for 12 to 36 hours. During this time, the vehicle

battery shall be charged to a full state-of-charge. The vehicle must be turned off during charging. Charge time shall not exceed soak time.

2.6.3. Dynamometer Run.

At the end of the cold soak period with the vehicle in default mode or in normal mode if the vehicle does not have a default mode, place or push the vehicle onto a dynamometer, and drive the vehicle on a continuous US06 test cycle until one of the following conditions is met:

- (a) the auxiliary power unit starts, or
- (b) the vehicle can no longer meet the speed trace limits of the US06 driving schedule as specified in CFR 86 Appendix I to within 2 mph higher than the highest point on the trace within 1 second for the upper limit or within 2 mph lower than the lowest point on the trace within 1 second for the lower limit, or
- (c) the vehicle completes six (6) full US06 drive cycles without starting the auxiliary power unit.

When any of these conditions is met, the test may be ended. The All Electric Range for this test, in miles, shall be the distance driven from the start of the test to when condition (a) or (b), whichever occurs first, is met. However, if condition (c) is used to end the test, then the All Electric Range for this test shall be equal to the distance of six full US06 drive cycles. Emission sampling is not required for this test to determine US06 All-Electric Range.

2.6.4. Vehicle Charging after the US06 All-Electric Range Test.

The vehicle may be fully charged following the US06 All-Electric Range Test. If this option is performed, vehicle charging shall begin within three hours after the US06 All-Electric Range Test and the vehicle shall be charged to the manufacturer specified full state-of-charge. During charging, all applicable requirements in section E.1 must be met, and energy consumption shall be calculated pursuant to the requirements in section E.11.2.

3. Emission Testing General Provisions.

3.1. Applicability and General Provisions

Emission testing must be conducted pursuant to 40 CFR §1066.801, except as noted.

3.2. Use of Alternative Procedures and Alternative End-of-Test Criteria

3.2.1. Provision for Use of Alternative Test Procedures

A manufacturer may use alternative test procedures that are shown to yield equivalent results and have been approved in advance by the Executive Officer of the California Air Resources Board. A manufacturer must submit a request to the Executive Officer, at least 60 days in advance of the certification application of the applicable vehicle test group, with an engineering evaluation that demonstrates or justifies, based on good engineering judgment, the use of the alternative test procedures will yield equivalent results for the applicable vehicle test group. The Executive Officer shall review the submitted evaluation and shall use good engineering judgment to consider, on a case-by-case basis, the similarities and differences between the alternative procedures and the test procedures outlined in the applicable section of this document. Upon review, the Executive Officer shall approve, on a case-by-case basis, the alternative procedures if they yield equivalent results for the applicable vehicle test group. The Executive Officer shall notify the manufacturer of the decision no later than 30 days after receiving the request for the use of alternative test procedures.

Unless otherwise specified, approval requests and supporting information must be provided to the California Air Resources Board via e-mail at: onrld@arb.ca.gov

3.2.2. Provision for Use of Alternative End-of-Test Criteria

Where noted, a manufacturer may use alternative end-of-test criteria if approved in advance by the Executive Officer of the California Air Resources Board. A manufacturer must submit a request to the Executive Officer, at least 60 days in advance of the certification application of the applicable vehicle test group, vehicle test data or an engineering evaluation that justifies, through the application of good engineering judgment, the use of alternative-end-of test criteria and demonstrates that the alternative end-of-test criteria requirements are satisfied for the applicable vehicle test group. The Executive Officer shall review the submitted documents and shall use good engineering judgment to consider, on a case-by-case basis, the justification for the use of alternative end-of-test criteria and evaluate whether the alternative end-of-test criteria is satisfied by the applicable test group. Upon review, the Executive Officer shall approve, on a case-by-case basis, the use of alternative end-of-test criteria if the manufacturer justified the use of alternative end-of-test criteria and demonstrated that the alternative-end-of test criteria requirements are satisfied by the

applicable vehicle test group. The Executive Officer shall notify the manufacturer of the decision no later than 30 days after receiving the request for the use of alternative end-of-test criteria.

Unless otherwise specified, approval requests and supporting information must be provided to the California Air Resources Board via e-mail at: onrld@arb.ca.gov

3.3. Vehicle and Battery Break-In Period and Emission Stabilization.

A manufacturer shall use good engineering judgment in determining the proper stabilized emissions mileage test point and report same according to the requirements in section (i)(2) of the "Zero-Emission Vehicle Standards for 2026 and Subsequent Model Year Passenger Cars and Light-Duty Trucks".

3.4. Vehicle Operation and Driver Selectable Mode Requirements for Worst Case Emission Testing.

3.4.1. Urban Emission Testing.

For the purpose of demonstrating compliance with urban exhaust emission criteria pollutant standards, a vehicle must be emission tested in the vehicle operation (i.e., either charge-depleting, charge-sustaining, or charge-increasing operation) and driver-selectable mode (e.g., normal mode, economy mode, performance mode, battery charging mode, or any other operating mode available to the driver) that represents the worst case NMOG + NO_x emissions.

3.4.2. Alternative Urban Emission Test.

For vehicles that qualify for and are tested on the Alternative Urban Emission Test in section E.5, the worst case NMOG + NO_x urban emissions may be determined for the Alternative Urban Emission Test alone. If driver-selectable modes are available, each driver-selectable mode must still be considered for worst case NMOG + NO_x emissions for the Alternative Urban Emission Test.

3.4.3. Highway and SC03 Emission Testing.

For the purpose of demonstrating compliance with highway and SC03 criteria pollutant exhaust emission standards, a vehicle must be emission tested in the vehicle operation (i.e., either charge-sustaining or charge-increasing operation) and driver-selectable mode (if available) that represents the worst case NMOG + NO_x emissions.

3.4.4. US06 Emission Testing.

For the purpose of demonstrating compliance with US06 charge-sustaining emission test standards, a vehicle must be emission tested in the vehicle operation (i.e., either charge-sustaining or charge-increasing operation) and driver-selectable mode (if available) that represents the worst case NMOG + NOx emissions.

For the purpose of demonstrating compliance with US06 charge-depleting emission test standards, a vehicle must be emission tested in charge-depleting operation and in default mode or in normal mode if the vehicle does not have a default mode.

3.4.5. 20°F and 50°F Urban Emission Testing.

To satisfy test requirements for the 50°F emission test, a vehicle shall be emission tested in the vehicle operation and driver-selectable mode (if available) that represents the worst case urban NMOG + NOx emissions as determined either (1) using the procedure in section E.4 at 50°F or (2) using the procedure in section E.4 at temperatures between 68°F and 86°F and an engineering evaluation. The manufacturer must report the data and/or engineering evaluation used to determine the worst case operating mode at 50°F.

To satisfy test requirements for the 20°F emission test, a vehicle shall be emission tested in the vehicle operation and driver-selectable mode (if available) that represents the worst case CO emissions of the urban charge-depleting emission test or urban charge-sustaining emission test following the procedure outlined in section E.4 at 20°F.

If a vehicle qualifies for the Alternative Urban Emission Test, the worst case emissions for the 20°F and 50°F emission tests shall be determined according to E.3.4.2.

3.4.6. Alternative Determination of Worst Case Driver-Selectable Modes.

In lieu of demonstrating worst case emissions by certification testing in every driver-selectable mode for the Urban Emission Test Provisions in section E.4, Highway Emission Test Provisions in section E.6, and SFTP Emission Test Provisions in section E.7, a manufacturer may determine the worst case driver-selectable mode by using non-certification emission data and/or an engineering evaluation. The manufacturer must report the data and/or engineering evaluation used to determine the worst case driver-selectable mode. The manufacturer must demonstrate compliance with all applicable emission standards using test data for the worst case driver-selectable mode.

4. Urban Emission Test Provisions.

4.1. Urban Test Applicability and General Provisions.

To be conducted pursuant to 40 CFR §1066.801 with the following revisions:

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

4.1.2 Amend subparagraph (c)(1): The Urban Charge-Sustaining Emission Test and the Urban Charge-Depleting Emission Test.

4.1.3 Amend subparagraph (c)(1)(i): The Urban Charge-Sustaining Emission Test consists of an engine startup during the first UDDS cycle followed by a 10-minute key-off soak. After a 10-minute key-off soak, the subsequent UDDS cycle is a hot-start UDDS cycle. The Urban Charge-Depleting Emission Test consists of a series of charge-depleting UDDS cycles each followed by a 10-minute key-off soak until charge-sustaining operation is achieved. The Urban Charge-Depleting Emission Test begins with the vehicle at full state-of-charge with engine startup occurring during the driving of the series of charge-depleting UDDS cycles. The first engine startup (with all accessories turned off) that occurs during a UDDS cycle followed by a vehicle shutdown at the end of the UDDS cycle makes a complete cold-start UDDS cycle. After a 10-minute key-off soak, the subsequent UDDS cycle is a hot-start UDDS cycle. For the Urban Charge-Depleting Emission Test, additional hot-start UDDS cycles each followed by a 10-minute key-off soak may be needed to achieve charge-sustaining operation. The UDDS cycle can be considered as a two phase cycle where the first 505 seconds of the UDDS cycle is the transient phase, and the remaining 867 seconds of the UDDS cycle is the stabilized phase.

4.1.4 Subparagraphs (c)(1)(ii) through (c)(5). [Not applicable.]

4.1.5 Subparagraph (d). [No change.]

4.1.6 Subparagraph (e). [No change except the hot soak test temperature in the three-day diurnal emission test sequence is 105°F.]

4.2. Urban Charge-Sustaining Emission Test.

4.2.1. Vehicle Preconditioning for Urban Charge Sustaining Emission Test.

To be conducted pursuant to the "California Evaporative Emission Standards and Test Procedures for 2026 and Subsequent Model Passenger Cars, Light-

Duty Trucks, Medium-Duty Vehicles, and Heavy-Duty Vehicles” with the following supplemental requirements:

- 4.2.1.1** The vehicle shall be preconditioned in charge-sustaining operation with the vehicle in default mode or in normal mode if the vehicle does not have default mode. If, however, the vehicle is to be tested in charge-increasing operation (this does not apply to a driver-selectable charge-increasing mode), then the initial SOC for the preconditioning drive shall be set at the lowest normal SOC level allowed by the vehicle when driving on the UDDS cycle.
- 4.2.1.2** The vehicle shall be pushed or towed to a work area for the initial fuel drain and fill according to section III.D.1.5 of the “California Evaporative Emission Standards and Test Procedures for 2026 and Subsequent Model Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles, and Heavy-Duty Vehicles.”
- 4.2.1.3** Following the initial fuel drain and fill, the vehicle shall complete an initial soak period of a minimum of 6 hours.
- 4.2.1.4** After completing the initial soak period, the vehicle shall be pushed or towed into position on a dynamometer and preconditioned.
- 4.2.1.5** The preconditioning cycle shall be the UDDS cycle and performed at this time. Except as noted in section E.4.2.1.8, the initial SOC may be set after the preconditioning cycle by driving an additional distance on the chassis dynamometer such that the SOC Criterion for the subsequent emission test is more likely to be satisfied when applying the $\pm 1\%$ SOC Net Energy Change Tolerances in section E.10.
- 4.2.1.6** A fuel drain and fill shall be performed pursuant to the provisions of the “California Evaporative Emission Standards and Test Procedures for 2026 and Subsequent Model Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles, and Heavy-Duty Vehicles.”
- 4.2.1.7** The vehicle shall be soaked for 12-36 hours. During this soak period, canister preconditioning shall be performed pursuant to the provisions of the “California Evaporative Emission Standards and Test Procedures for 2026 and Subsequent Model Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles, and Heavy-Duty Vehicles.”

4.2.1.8 Initial SOC may be set during the soak period by discharging or charging the vehicle such that the SOC Criterion for the subsequent emission test is more likely to be satisfied when applying the $\pm 1\%$ SOC Net Energy Change Tolerances in section E.10, except as follows:

4.2.1.8.1 If the Alternative End-of-Test Criterion in section E.4.2.4 is used, then initial SOC setting shall not be permitted after the preconditioning cycle nor during the soak period prior to the Urban Charge-Sustaining Emission Test.

4.2.1.8.2 If testing a vehicle in a charge-increasing driver-selectable mode, then initial SOC setting shall not be permitted after the preconditioning cycle nor during the soak period prior to the Urban Charge-Sustaining Emission Test.

4.2.1.8.3 If testing a vehicle in charge-increasing operation, then the initial SOC for the Urban Charge-Sustaining Emission Test shall be set at the lowest normal SOC level allowed by the vehicle when driving on the UDDS cycle.

4.2.2. Determination of Urban Charge-Sustaining Emissions –Dynamometer Test Run, Gaseous and Particulate Emissions.

To be conducted pursuant to 40 CFR §1066.815 with the following revisions:

4.2.2.1 General

4.2.2.1.1 Amend subparagraph (a): General. The Urban Charge-Sustaining Emission Test consists of a cold-start UDDS cycle and a hot-start UDDS cycle as described in section E.4.1.3. If driver-selectable modes are available, activate the driver-selectable mode to be tested for the Urban Charge-Sustaining Emission Test to determine worst case emissions as described in section E.3.4.

4.2.2.2 PM Sampling

4.2.2.2.1 Amend subparagraph (b): PM sampling options. Collect PM using the procedures specified in subparagraphs (b)(1) or (b)(2) or (b)(5) of 40 CFR §1066.815 (subparagraphs (b)(3) and (b)(4) are not applicable) and use the corresponding equation in section E.4.2.6 to calculate composite PM emissions. Testing

must meet the requirements related to filter face velocity as described in 40 CFR §1065.170 (c)(1)(vi) [October 25, 2016], except as specified in paragraph (b)(5) of 40 CFR §1066.815 [October 25, 2016]. For procedures involving flow weighting, set the filter face velocity to a weighting target of 1.0 to meet the requirements of 40 CFR §1065.170(c)(1)(vi) [October 25, 2016]. Allow filter face velocity to decrease as a percentage of the weighting factor if the weighting factor is less than 1.0. Use the appropriate equations in 40 CFR §1066.610 to show that you meet the dilution factor requirements of 40 CFR §1066.110 (b)(2)(iii)(B).

4.2.2.2.2 Amend subparagraphs (b)(1): A separate PM sample for transient and stabilized phases of the cold-start UDDS cycle and the hot-start UDDS cycle may be collected. This may be done by sampling with four filters.

4.2.2.2.3 Subparagraph (b)(2). [No change.]

4.2.2.2.4 Delete subparagraphs (b)(3) and (b)(4).

4.2.2.2.5 Subparagraphs (b)(5). [No change.]

4.2.2.3 Gaseous Sampling

4.2.2.3.1 Subparagraphs (c)(1) and (c)(2). [No change.]

4.2.2.3.2 Delete subparagraph (c)(3).

4.2.2.4 Test Sequence

4.2.2.4.1 Amend subparagraph (d): Test sequence. Follow the exhaust emission measurement procedures specified in 40 CFR §1066.410 through §1066.425, subject to the following exceptions and additional provisions:

4.2.2.4.2 Subparagraph (d)(1). [No change.]

4.2.2.4.3 Amend subparagraph (d)(1)(i): Precondition the vehicle as described in section E.4.2.1. Initiate the cold-start Urban Charge-Sustaining Emission Test in the driver-selectable mode to be tested following the 12 to 36 hour soak period.

4.2.2.4.4 Subparagraphs (d)(1)(ii) and (d)(1)(iii). [No change.]

4.2.2.4.5 Amend subparagraph (d)(1)(iv): Five seconds after the vehicle is turned off, stop all stabilized interval sampling and recording, including background sampling. Stop any integrating devices for the stabilized interval and indicate the end of the stabilized interval in the recorded data. Note that the 5 second delay is intended to account for sampling system transport.

4.2.2.4.6 Subparagraph (d)(2). [No change.]

4.2.2.4.7 Amend subparagraph (d)(2)(i): Initiate the hot-start UDDS cycle in the driver-selectable mode to be tested (9 to 11 minutes) after the end of the sample period for the cold-start UDDS cycle.

4.2.2.4.8 Amend subparagraph (d)(2)(ii): Repeat the steps in paragraph (d)(1)(ii) of this section.

4.2.2.4.9 Amend subparagraph (d)(2)(iii): For bag 4 measurement or single bag per UDDS cycle measurement, operate the vehicle over the remainder of the UDDS and conclude the testing as described in paragraphs (d)(1)(iii) and (iv) of this section.

4.2.3. End-of-Test Criteria.

Amend subparagraph (3): A valid test shall satisfy the SOC Net Energy Change Tolerances in section E.10. For PHEVs that use a battery as an energy storage device, $(\text{Amp}\cdot\text{hr}_{\text{initial}})$ is the stored charge at the beginning of the cold-start UDDS cycle, and $(\text{Amp}\cdot\text{hr}_{\text{final}})$ is the stored battery charge at the end of the subsequent hot-start UDDS cycle. The final stored battery charge, $(\text{Amp}\cdot\text{hr}_{\text{final}})$, shall not exceed either $(\text{Amp}\cdot\text{hr}_{\text{final}})_{\text{max}}$ or $(\text{Amp}\cdot\text{hr}_{\text{final}})_{\text{min}}$ for a valid test. For PHEVs that use a capacitor as an energy storage device, (V_{initial}^2) is the square of the capacitor voltage stored at the beginning of the cold-start UDDS cycle, and (V_{final}) is the stored capacitor voltage at the end of the subsequent hot-start UDDS cycle. The final stored capacitor voltage, (V_{final}) , shall not exceed either $(V_{\text{final}})_{\text{max}}$ or $(V_{\text{final}})_{\text{min}}$ for a valid test. For PHEVs that use an electro-mechanical flywheel as an energy storage device, $(\text{rpm}^2_{\text{initial}})$ is the squared flywheel rotational speed at the beginning of the cold-start UDDS cycle, and $(\text{rpm}_{\text{final}})$ is the flywheel rotational speed at the end of the subsequent hot-start UDDS

cycle. The final flywheel rotational speed, ($\text{rpm}_{\text{final}}$), shall not exceed either $(\text{rpm}_{\text{final}})_{\text{max}}$ or $(\text{rpm}_{\text{final}})_{\text{min}}$ for a valid test.

4.2.4. Alternative End-of-Test Criteria.

With approval from the Executive Officer under the procedure in subsection E.3.2.2, if the End-of-Test Criteria in section E.4.2.3 is not satisfied after the hot-start UDDS cycle, an Urban Charge-Sustaining Emission Test may be considered valid if:

4.2.4.1 The alternative End-of-Test criterion of $\pm 5\%$ SOC Net Energy Change Tolerance in Appendix C of SAE J1711 is satisfied (Note: Appendix C of SAE J1711 may not be used to correct measured values for any emissions.); or

4.2.4.2 The SOC at the end of the hot-start UDDS cycle is higher than the SOC at the beginning of the cold-start UDDS cycle.

4.2.5. Urban Charge-Sustaining Gaseous Emissions Calculations.

To be conducted pursuant to 40 CFR §1066.820 [October 25, 2016] with the following revisions:

4.2.5.1 Subparagraph (a). [No change.]

4.2.5.2 Amend subparagraph (b): Calculate the final composite gaseous test results as a mass-weighted value, $e_{[\text{emission}]\text{-FTPcomp}}$, in grams per mile using the following equation:
 $m_c =$ the mass emissions determined from the cold-start UDDS cycle, in grams. If the cold-start UDDS cycle consists of phase 1 cold transient emissions and phase 2 cold stabilized emissions, then sum phase 1 and phase 2 emissions to determine m_c .
$$e_{[\text{emission}]\text{-FTPcomp}} = 0.43 \left(\frac{m_c}{D_c} \right) + 0.57 \left(\frac{m_h}{D_h} \right)$$

Where: D_c = the measured driving distance from the cold-start UDDS cycle, in miles. If the cold-start UDDS cycle consists of phase 1 distance and phase 2 distance, then sum phase 1 and phase 2 distances to determine D_c .

m_h = the mass emissions determined from the hot-start UDDS cycle, in grams. If the hot-start UDDS cycle consists of phase 3 hot transient emissions and phase 4 hot stabilized emissions, then sum phase 3 and phase 4 emissions to determine m_h .

and phase 2 distance, then sum phase 1 and phase 2 distances to determine D_c .

m_h = the mass emissions determined from the hot-start UDDS cycle, in grams. If the hot-start UDDS cycle consists of phase 3 hot transient emissions and phase 4 hot stabilized emissions, then sum phase 3 and phase 4 emissions to determine m_h .

D_h = the measured driving distance from the hot-start UDDS cycle, in miles. If the hot-start UDDS cycle consists of phase 3 distance and phase 4 distance, then sum phase 3 and phase 4 distances to determine D_h .

4.2.5.3 Subparagraph (c). [Not applicable.]

4.2.6. Urban Charge-Sustaining Particulate Emissions Calculations.

To be conducted pursuant to 40 CFR §1066.820 with the following revisions:

4.2.6.1 Subparagraphs (a) to (b). [Not applicable.]

4.2.6.2 Amend subparagraphs (c) through (c)(1): Calculate the final composite PM test results as a mass-weighted value, $e_{PM-FTPcomp}$, in grams per mile as follows:

(1) Use the following equation for PM measured as described in

§1066.815(b)(1) and (2): $m_{PM-cold}$ = the combined PM mass emissions determined from the cold-start UDDS cycle (phase 1 and phase 2), in grams, as calculated using Eq. 1066.605-2.

$$e_{PM-FTPcomp} = 0.43 \left(\frac{m_{PM-cold}}{D_c} \right) + 0.57 \left(\frac{m_{PM-hot}}{D_h} \right)$$

Where:

D_c = the measured driving distance from the cold-start UDDS cycle, in miles. If the cold start UDDS cycle consists of phase 1 distance and phase 2 distance, then sum phase 1 and phase 2 distances to determine D_c .

m_{PM-hot} = the combined PM mass emissions determined from the hot-start UDDS cycle (phase 3 and phase 4), in grams, as calculated using Eq. 1066.605-2.

D_h = the measured driving distance from the hot-start UDDS cycle, in miles. If the hot-start UDDS cycle consists of phase 3 distance and phase 4 distance, then sum phase 3 and phase 4 distances to determine D_h .

hot-start UDDS cycle (phase 3 and phase 4), in grams, as calculated using Eq. 1066.605-2.

D_h = the measured driving distance from the hot-start UDDS cycle, in miles. If the hot-start UDDS cycle consists of phase 3 distance and phase 4 distance, then sum phase 3 and phase 4 distances to determine D_h .

m_{PM} = the combined PM mass emissions determined from the cold-start UDDS cycle and the hot-start UDDS cycle (phase 1, phase 2, phase 3, and phase 4), in grams, as calculated using Eq. 1066.605-4

4.2.6.3 Subparagraph (c)(2). [Not applicable.]

4.2.6.4 Amend subparagraph (c)(3): Use the following equation for PM measured as described in 1066.615 (b)(3).
 $D_c = \frac{m_{PM} - FTP_{comp}}{0.43(D_c) + 0.57(D_h)}$
the measured driving distance from the cold-start UDDS cycle, in miles. If the cold-start UDDS cycle consists of phase 1 distance and phase 2 distance, then sum phase 1 and phase 2 distances to determine D_c .

Where: D_h ≡ the measured driving distance from the hot-start UDDS cycle, in miles. If the hot-start UDDS cycle consists of phase 3 distance and phase 4 distance, then sum phase 3 and phase 4 distances to determine D_h .

D_c = the measured driving distance from the cold-start UDDS cycle, in miles. If the cold-start UDDS cycle consists of phase 1 distance and phase 2 distance, then sum phase 1 and phase 2 distances to determine D_c .

D_h = the measured driving distance from the hot-start UDDS cycle, in miles. If the hot-start UDDS cycle consists of phase 3 distance and phase 4 distance, then sum phase 3 and phase 4 distances to determine D_h .

4.3. Urban Charge-Depleting Emission Test.

4.3.1. Vehicle Preconditioning for Urban Charge-Depleting Emission Test.

To be conducted pursuant to the "California Evaporative Emission Standards and Test Procedures for 2026 and Subsequent Model Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles, and Heavy-Duty Vehicles" with the following supplemental requirements:

4.3.1.1 The vehicle shall be preconditioned in charge-sustaining operation with the vehicle in default mode or in normal mode if the vehicle does not have default mode. If, however, the vehicle is to be tested in charge-

increasing operation (this does not apply to a driver-selectable charge-increasing mode), then the initial SOC for the preconditioning drive shall be set at the lowest normal SOC level allowed by the vehicle when driving on the UDDS cycle.

4.3.1.2 The vehicle shall be pushed or towed to a work area for the initial fuel drain and fill according to section III.D.1.5 of the "California Evaporative Emission Standards and Test Procedures for 2026 and Subsequent Model Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles, and Heavy-Duty Vehicles."

4.3.1.3 Following the initial fuel drain and fill, the vehicle shall complete an initial soak period of a minimum of 6 hours.

4.3.1.4 After completing the initial soak period, the vehicle shall be pushed or towed into position on a dynamometer and preconditioned.

4.3.1.5 The preconditioning cycle shall be the UDDS cycle and performed at this time.

4.3.1.6 A fuel drain and fill shall be performed pursuant to the provisions of the "California Evaporative Emission Standards and Test Procedures for 2026 and Subsequent Model Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles, and Heavy-Duty Vehicles."

4.3.1.7 The vehicle shall be soaked for 12-36 hours. During this soak period, canister preconditioning shall be performed pursuant to the provisions of the "California Evaporative Emission Standards and Test Procedures for 2026 and Subsequent Model Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles, and Heavy-Duty Vehicles."

4.3.1.8 Charge the vehicle to full state-of-charge as specified by the vehicle manufacturer. The vehicle must be turned off during charging and charge time shall not exceed soak time.

4.3.2. Determination of Urban Charge- Depleting Emissions –Dynamometer Test Run, Gaseous and Particulate Emissions.

To be conducted pursuant to 40 CFR §1066.815 with the following revisions:

4.3.2.1 General

- 4.3.2.1.1 Amend subparagraph (a): The Urban Charge-Depleting Emission Test consists of the Urban All-Electric Range Test, a cold-start UDDS cycle when the engine starts followed by a 10-minute key off soak and hot-start UDDS cycle(s) as described in section E.4.1.3. The Continuous Urban Test Schedule is used for the Urban Charge-Depleting Emission Test. If driver-selectable modes are available that can be appropriately tested with charge-depleting operation, then test the appropriate driver-selectable mode(s) as required for the Urban Charge-Depleting Emission Test to determine worst case emissions as described in section E.3.4.
- 4.3.2.1.2 The Alternative Continuous Urban Test Schedule may be substituted for the Continuous Urban Test Schedule if the test facility is unable to perform the Continuous Urban Test Schedule.
- 4.3.2.1.3 Refer to sections E.4.3.6, E.4.3.7, and E.11, for calculations of urban exhaust emissions, urban particulate emissions, and equivalent all-electric range, respectively. Emissions shall be measured for all test cycles when the engine is operating. For each test cycle during which emissions are not generated, emissions are not required to be sampled. However, the manufacturer must validate that the engine did not turn on at any time during the test cycle. If the engine starts operating toward the end of the cold-start UDDS cycle such that the vehicle does not achieve full warm-up conditions prior to the subsequent hot-start UDDS cycle, an additional hot-start UDDS cycle may be performed following the first hot-start UDDS cycle and be included in the hot-start mass summations Σm_h in the equation of section E.4.3.6.2 and $\Sigma m_{PM-hUDDS}$ of the equation in section E.4.3.7.2 along with the associated distance summations ΣD_h .

4.3.2.2 PM Sampling

- 4.3.2.2.1 Amend subparagraph (b): Collect PM using the procedures specified in subparagraphs (b)(1) or (b)(2) or (b)(5) of 40 CFR §1066.815 (subparagraphs (b)(3) and (b)(4) are not applicable) and use the corresponding equation in section E.4.3.7 to calculate composite PM emissions. Testing must meet the

requirements related to filter face velocity as described in 40 CFR §1065.170 (c)(1)(vi) [October 25, 2016], except as specified in paragraph (b)(5) of 40 CFR §1066.815. For procedures involving flow weighting, set the filter face velocity to a weighting target of 1.0 to meet the requirements of 40 CFR §1065.170(c)(1)(vi) [October 25, 2016]. Allow filter face velocity to decrease as a percentage of the weighting factor if the weighting factor is less than 1.0. Use the appropriate equations in 40 CFR §1066.610 to show that you meet the dilution factor requirements of 40 CFR §1066.110 (b)(2)(iii)(B).

4.3.2.2.2 Amend subparagraphs (b)(1): A separate PM sample for transient and stabilized phases of the cold-start UDDS cycle and the hot-start UDDS cycle may be collected. This may be done by sampling with four filters.

4.3.2.2.3 Subparagraph (b)(2). [No change.]

4.3.2.2.4 Delete subparagraphs (b)(3) and (b)(4).

4.3.2.2.5 Subparagraphs (b)(5) [No change.]

4.3.2.3 Gaseous Sampling

4.3.2.3.1 Subparagraphs (c)(1) and (c)(2). [No change.]

4.3.2.3.2 Delete subparagraph (c)(3).

4.3.2.4 Test Sequence

4.3.2.4.1 Amend subparagraph (d): Follow the exhaust emission measurement procedures specified in 40 CFR §1066.410 through §1066.425, subject to the following exceptions and additional provisions:

4.3.2.4.2 Subparagraph (d)(1). [No change.]

4.3.2.4.3 Amend subparagraph (d)(1)(i): Precondition the vehicle as described in section E.4.3.1. Initiate the cold-start Urban Charge-Depleting Emission Test in the appropriate driver-selectable mode to be tested following the 12 to 36 hour soak period.

4.3.2.4.4 Subparagraphs (d)(1)(ii) and (d)(1)(iii). [No change.]

4.3.2.4.5 Amend subparagraph (d)(1)(iv): Five seconds after the vehicle is turned off, stop all stabilized interval sampling and recording, including background sampling. Stop any integrating devices for the stabilized interval and indicate the end of the stabilized interval in the recorded data. Note that the 5 second delay is intended to account for sampling system transport.

4.3.2.4.6 Subparagraph (d)(2). [No change.]

4.3.2.4.7 Amend subparagraph (d)(2)(i): Initiate the hot-start UDDS cycle in the driver-selectable mode to be tested (9 to 11 minutes) after the end of the sample period for the cold-start UDDS cycle.

4.3.2.4.8 Amend subparagraph (d)(2)(ii): Repeat the steps in paragraph (d)(1)(ii) of this section.

4.3.2.4.9 Amend subparagraph (d)(2)(iii): For bag 4 measurement or single bag per UDDS cycle measurement, operate the vehicle over the remainder of the UDDS and conclude the testing as described in subparagraphs (d)(1)(iii) and (iv) of this section.

4.3.3. End-of-Test Criteria.

Amend subparagraph (3): A valid test shall satisfy the SOC Net Energy Change Tolerances in section E.10. For PHEVs that use a battery as an energy storage device, $(\text{Amp}\cdot\text{hr}_{\text{initial}})$ is the stored charge at the beginning of the cold-start UDDS cycle, and $(\text{Amp}\cdot\text{hr}_{\text{final}})$ is the stored battery charge at the end of the next hot-start UDDS cycle immediately following the cold-start UDDS cycle. The final stored battery charge, $(\text{Amp}\cdot\text{hr}_{\text{final}})$, shall not exceed either $(\text{Amp}\cdot\text{hr}_{\text{final}})_{\text{max}}$ or $(\text{Amp}\cdot\text{hr}_{\text{final}})_{\text{min}}$ for a valid test. For PHEVs that use a capacitor as an energy storage device, (V^2_{initial}) is the square of the capacitor voltage stored at the beginning of the cold-start UDDS cycle, and (V_{final}) is the stored capacitor voltage at the end of the next hot-start UDDS cycle immediately following the cold-start UDDS cycle. The final stored capacitor voltage, (V_{final}) , shall not exceed either $(V_{\text{final}})_{\text{max}}$ or $(V_{\text{final}})_{\text{min}}$ for a valid test. For PHEVs that use an electro-mechanical flywheel as an energy storage device, $(\text{rpm}^2_{\text{initial}})$ is the squared flywheel rotational speed at the beginning of the cold-start UDDS cycle, and $(\text{rpm}_{\text{final}})$ is the flywheel rotational speed at the end of the next hot-start UDDS

cycle immediately following the cold-start UDDS cycle. The final flywheel rotational speed, (rpm_{final}) , shall not exceed either $(rpm_{final})_{max}$ or $(rpm_{final})_{min}$ for a valid test.

4.3.4. Alternative End-of-Test Criteria.

With approval from the Executive Officer under the procedure in subsection E.3.2.2, if the End-of-Test Criteria in section E.4.3.3 is not satisfied after the hot-start UDDS cycle, an Urban Charge-Depleting Emission Test may be considered valid if:

4.3.4.1 The alternative End-of-Test criteria in Section 3.9 or Section 3.9.1 of SAE J1711 are satisfied; or

4.3.4.2 The SOC at the end of the hot-start UDDS cycle is higher than the SOC at the beginning of the cold-start UDDS cycle.

4.3.5. Vehicle Charging After Testing.

Vehicle charging shall begin within three hours after the charge-depleting emission test, and the vehicle shall be charged to the manufacturer specified full state-of-charge. During charging, all applicable requirements in section E.1 must be met, and energy consumption shall be calculated pursuant to the requirements in section E.11.2.

4.3.6. Urban Charge-Depleting Gaseous Emissions Calculations.

To be conducted pursuant to 40 CFR §1066.820 [October 25, 2016] with the following revisions:

4.3.6.1 Subparagraph (a). [No change.]

4.3.6.2 Amend subparagraph (b): Calculate the final composite gaseous test results as a mass-weighted value, $e_{[emission]-FTPcomp}$, in grams per mile using the following equation:

$$e_{[emission]-FTPcomp} = 0.43 \left(\frac{m_c}{D_c} \right) + 0.57 \left(\frac{\sum m_h}{\sum D_h} \right)$$

Where:

- m_c = the mass emissions determined from the cold-start UDDS cycle, in grams. If the cold-start UDDS cycle consists of phase 1 cold transient emissions and phase 2 cold stabilized emissions, then sum phase 1 and phase 2 emissions to determine m_c .
- D_c = the measured driving distance from the cold-start UDDS cycle, in miles. If the cold-start UDDS cycle consists of phase 1 distance and phase 2 distance, then sum phase 1 and phase 2 distances to determine D_c .
- Σm_h = the summation of the mass emissions determined from each hot-start UDDS cycle, in grams. If a hot-start UDDS cycle consists of phase 3 hot transient emissions and phase 4 hot stabilized emissions, then sum phase 3 and phase 4 emissions to determine m_h for each hot-start UDDS cycle.
- ΣD_h = the summation of the measured driving distances from each hot-start UDDS cycle, in miles. If a hot-start UDDS cycle consists of phase 3 distance and phase 4 distance, then sum phase 3 and phase 4 distances to determine D_h for each hot-start UDDS cycle.

4.3.6.3 Subparagraphs (c). [Not applicable.]

4.3.7. Urban Charge-Depleting Particulate Emissions Calculations.

To be conducted pursuant to 40 CFR §1066.820 with the following revisions:

4.3.7.1 Subparagraph (a) to (b). [Not applicable.]

4.3.7.2 Amend subparagraphs (c) through (c)(1): Calculate the final composite PM test results as a mass-weighted value, $e_{PM-FTP_{comp}}$, in grams per mile, using the following equation for PM measured as described in §1066.815(b)(1) or (2):

$$e_{PM-FTP_{comp}} = 0.43 \left(\frac{m_{PM-cUDDS}}{D_c} \right) + 0.57 \left(\frac{\Sigma m_{PM-hUDDS}}{\Sigma D_h} \right)$$

Where:

- $m_{PM-cUDDS}$ = the combined PM mass emissions determined from the cold-start UDDS cycle (phase 1 and phase 2), in grams, as calculated using Eq. 1066.605-2.
- D_c = the measured driving distance from the cold-start UDDS cycle, in miles. If the cold-start UDDS cycle consists of phase 1 distance and phase 2 distance, then sum phase 1 and phase 2 distances to determine D_c .
- $\Sigma m_{PM-hUDDS}$ = the summation of the PM mass emissions determined from each hot-start UDDS cycle, in grams, as calculated using Eq. 1066.605-2. If a hot-start UDDS cycle consists of phase 3 hot transient emissions and phase 4 hot stabilized emissions, then sum phase 3 and phase 4 emissions to determine $m_{PM-hUDDS}$ for each hot-start UDDS cycle.
- ΣD_h = the summation of the measured driving distances from each hot-start UDDS cycle, in miles. If a hot-start UDDS cycle consists of phase 3 distance and phase 4 distance, then sum phase 3 and phase 4 distances to determine D_h for each hot-start UDDS cycle.

4.3.7.3 Subparagraph (c)(2). [Not applicable.]

4.3.7.4 Amend subparagraph (c)(3): Use the following equation for PM measured as described in §1066.815(b)(5):

$$e_{PM-FTPcomp} = \frac{m_{PM}}{0.43(D_c) + 0.57(D_h)}$$

Where: m_{PM} = the combined PM mass emissions determined from the cold-start UDDS cycle and the hot-start UDDS cycle (phase 1, phase 2, phase 3, and phase 4), in grams, as calculated using Eq. 1066.605-4.

D_c = the measured driving distance from the cold-start UDDS cycle, in miles. If the cold-start UDDS cycle consists of phase 1 distance and phase 2 distance, then sum phase 1 and phase 2 distances to determine D_c .

D_h = the measured driving distance from the hot-start UDDS cycle, in miles. If the hot-start UDDS cycle consists of phase 3 distance and phase 4 distance, then sum phase 3 and phase 4 distances to determine D_h .

4.4. Partial Soak Emission Testing.

The test sequence consists of an Urban Charge-Sustaining Emission Test as described in subsection E.4.2 followed by one, or a consecutive sequence of, Cold-Start Partial Soak Tests as described by the following procedure:

4.4.1. Vehicle Preconditioning Requirements.

Conduct an Urban Charge-Sustaining Emission Test as described in subsection E.4.2.

4.4.2. Partial Soak.

After the Urban Charge-Sustaining Emission Test is complete, the vehicle shall be soaked for 10 minutes to 12 hours. Throughout the soak period, the vehicle shall remain shut off, the engine compartment cover (i.e. hood) shall be closed, and cooling of any vehicle components is not permitted, except by ambient air. The ambient air temperature must remain between 68 to 86 degrees Fahrenheit throughout the soak period.

4.4.3. Cold-Start Partial Soak Test Run.

Following the 10 minute to 12 hour soak period, initiate a Cold-Start Partial Soak Test by following 40 CFR §1066.815 with the following revisions:

Amend subparagraph (a): General. The Cold-Start Partial Soak Test consists of one UDDS cycle. Conduct the Cold-Start Partial Soak Test in charge-sustaining vehicle operation and driver-selectable mode (e.g., normal mode, economy mode, performance mode, battery charging mode, or any other operating mode available to the driver) that represent the worst case NMOG+NO_x emissions for the Cold-Start Partial Soak Test.

Amend subparagraph (b): PM sampling options. [n/a]

Subparagraphs (c)(1) and (c)(2). [No change.]

Subparagraphs (c)(3). [n/a]

Amend subparagraph (d): Test sequence. Follow the exhaust emission measurement procedures specified in 40 CFR §1066.410 through §1066.425, subject to the following exceptions and additional provisions:

Subparagraph (d)(1). Take the following steps for the cold-start partial soak test:

Amend subparagraph (d)(1)(i): Following the 10 minute to 12 hour soak, initiate the Cold-Start Partial Soak Test in the driver-selectable mode to be tested by operating the vehicle over one UDDS cycle.

Subparagraph (d)(1)(ii) to (d)(1)(iv). [No change.]

Subparagraph (d)(2) and (d)(3). [n/a].

4.4.4. End-of-Test Criteria.

A valid test shall satisfy the SOC Net Energy Change Tolerances in section E.10. For PHEVs that use a battery as an energy storage device, $(\text{Amp}\cdot\text{hr})_{\text{initial}}$ is the stored charge at the beginning of the Cold-Start Partial Soak Test, and $(\text{Amp}\cdot\text{hr})_{\text{final}}$ is the stored battery charge at the end of the Cold-Start Partial Soak Test. The final stored battery charge, $(\text{Amp}\cdot\text{hr})_{\text{final}}$, shall not exceed either $(\text{Amp}\cdot\text{hr})_{\text{final}\text{max}}$ or $(\text{Amp}\cdot\text{hr})_{\text{final}\text{min}}$ for a valid test. For PHEVs that use a capacitor as an energy storage device, $(V^2)_{\text{initial}}$ is the square of the capacitor voltage stored at the beginning of the Cold-Start Partial Soak Test, and (V_{final}) is the stored capacitor voltage at the end of the Cold-Start Partial Soak Test. The final stored capacitor voltage, (V_{final}) , shall not exceed either $(V_{\text{final}})_{\text{max}}$ or $(V_{\text{final}})_{\text{min}}$ for a valid test. For PHEVs that use an electro-mechanical flywheel as an energy storage device, $(\text{rpm}^2)_{\text{initial}}$ is the squared flywheel rotational speed at the beginning of the Cold-Start Partial Soak Test, and $(\text{rpm}_{\text{final}})$ is the flywheel rotational speed at the end of the Cold-Start Partial Soak Test. The final flywheel rotational speed, $(\text{rpm}_{\text{final}})$, shall not exceed either $(\text{rpm}_{\text{final}})_{\text{max}}$ or $(\text{rpm}_{\text{final}})_{\text{min}}$ for a valid test.

4.4.5. Alternative End-of-Test Criteria.

With approval from the Executive Officer under the procedure in subsection E.3.2.2, if the End-of-Test Criteria in section E.4.4.4 is not satisfied after the Cold-Start Partial Soak Test, the test may be considered valid if:

4.4.5.1 The alternative End-of-Test criterion of $\pm 5\%$ SOC Net Energy Change Tolerance in Appendix C of SAE J1711 is satisfied (Note: Appendix C

of SAE J1711 may not be used to correct measured values for any emissions.); or

4.4.5.2 The SOC at the end of the Cold-Start Partial Soak Test is higher than the SOC at the beginning of the Cold-Start Partial Soak Test.

4.4.6. Option to Conduct Additional Cold-Start Partial Soak Tests.

The test sequence outlined in subsections E.4.4.2 to E.4.4.5 may be repeated to measure exhaust emissions on additional Cold-Start Partial Soak Tests.

4.4.7. Partial Soak Test Emissions Calculations.

To be conducted pursuant to 40 CFR §1066.820 [October 25, 2016] with the following revisions:

4.4.7.1 Amend Subparagraph (a) as follows: Determine the mass of exhaust emissions of each pollutant for each test interval in Subsection E.4.4.7.2 as described in §1066.605.

4.4.7.2 Amend Subparagraph (b) as follows: Calculate the final composite gaseous test results as the mass-weighted average of the Cold-Start Partial Soak Test results and the mass emissions determined from the Cold-Start Partial Soak Test in subsection E.4.4.3, in grams. If the Cold-Start Partial Soak Test consists of phase 1 cold transient emissions and phase 2 cold stabilized emissions, then sum phase 1 and phase 2 emissions to determine m_{ps} .
$$e_{partial\ soak} = 0.43 \left(\frac{m_{ps}}{D_{ps}} \right) + 0.57 \left(\frac{m_h}{D_h} \right)$$

Where: m_{ps} = the mass emissions determined from the Cold-Start Partial Soak Test in subsection E.4.4.3, in grams. If the Cold-Start Partial Soak Test consists of phase 1 cold transient emissions and phase 2 cold stabilized emissions, then sum phase 1 and phase 2 emissions to determine m_{ps} .

m_h = the mass emissions determined from the hot-start UDDS cycle in subsection E.4.4.1, in grams. If the hot-start UDDS cycle consists of phase 3 hot transient emissions and phase 4 hot stabilized emissions, then sum phase 3 and phase 4 emissions to determine m_h .

D_{ps} = the measured driving distance from the Cold-Start Partial Soak Test in subsection E.4.4.3, in miles. If the Cold-Start Partial Soak Test consists of phase 1 distance and phase 2 distance, then sum phase 1 and phase 2 distances to determine D_{ps} .

D_h = the measured driving distance from the hot-start UDDS cycle in subsection E.4.4.1, in miles. If the hot-start UDDS cycle consists of phase 3 distance and phase 4 distance, then sum phase 3 and phase 4 distances to determine D_h .

4.4.7.3 Subparagraph (c). [n/a.]

4.5. Quick Drive-Away Emission Testing.

4.5.1. Vehicle Preconditioning for Quick Drive-Away Emission Test.

Precondition the vehicle following the procedure outlined in subsections E.4.2.1.1 to E.4.2.1.7.

Initial SOC may be set during the soak period by discharging or charging the vehicle such that the SOC Criterion for the Quick Drive-Away Emission Test is more likely to be satisfied when applying the $\pm 1\%$ SOC Net Energy Change Tolerances in section E.10, except as follows:

If the Alternative End-of-Test Criterion in section E.4.5.4 is used, then initial SOC setting shall not be permitted after the preconditioning cycle nor during the soak period prior to the Quick Drive-Away Emission Test.

If testing a vehicle in a charge-increasing driver-selectable mode, then initial SOC setting shall not be permitted after the preconditioning cycle nor during the soak period prior to the Quick Drive-Away Emission Test.

4.5.2. Quick Drive-Away Test Run.

Amend §1066.815 as follows:

Amend subparagraph (a): General. The Quick Drive-Away Emission Test consists of a cold-start Quick Drive-Away UDDS cycle. Conduct the Quick Drive-Away Test in charge-sustaining vehicle operation and driver-selectable mode (e.g., normal mode, economy mode, performance mode, battery charging mode, or any other operating mode available to the driver) that represent the worst case NMOG+NO_x emissions for the Quick Drive-Away Emission Test.

Amend subparagraph (b): PM sampling options. [n/a]

Subparagraphs (c)(1) and (c)(2). [No change.]

Subparagraphs (c)(3). [n/a]

Amend subparagraph (d): Test sequence. Follow the exhaust emission measurement procedures specified in 40 CFR §1066.410 through §1066.425, subject to the following exceptions and additional provisions:

Subparagraph (d)(1). Take the following steps for the Quick Drive-Away Emission Test:

Amend subparagraph (d)(1)(i): Following the 12 to 36 hour soak, initiate the Quick Drive-Away Emission Test in the driver-selectable mode to be tested by operating the vehicle over one Quick Drive-Away UDDS cycle described in subsection H 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".

Amend subparagraph (d)(1)(ii): Start sampling and recording simultaneously with starting the vehicle. Place the vehicle in gear 6 seconds after engine starting, which is 2 seconds before the first acceleration.

Amend subparagraph (d)(1)(iii): At the end of the deceleration scheduled to occur 505 seconds into the Quick Drive-Away UDDS, simultaneously switch all the sample flows from the cold-start transient interval to the stabilized interval, stopping all cold-start transient interval sampling and recording, including background sampling. Reset integrating devices for the stabilized interval and indicate the end of the cold-start interval in the recorded data. Operate the vehicle over the remainder of the Quick Drive-Away UDDS. Turn the engine off 2 seconds after the end of the last deceleration in the stabilized interval (1,369 seconds after the start of the driving schedule).

Subparagraph (d)(1)(iv). [No change.]

Subparagraph (d)(2) and (d)(3). [n/a].

4.5.3. End-of-Test Criteria.

A valid test shall satisfy the SOC Net Energy Change Tolerances in section E.10. For PHEVs that use a battery as an energy storage device, $(\text{Amp}\cdot\text{hr}_{\text{initial}})$ is the stored charge at the beginning of the Quick Drive-Away Emission Test, and $(\text{Amp}\cdot\text{hr}_{\text{final}})$ is the stored battery charge at the end of the Quick Drive-Away Emission Test. The final stored battery charge, $(\text{Amp}\cdot\text{hr}_{\text{final}})$, shall not exceed either $(\text{Amp}\cdot\text{hr}_{\text{final}})_{\text{max}}$ or $(\text{Amp}\cdot\text{hr}_{\text{final}})_{\text{min}}$ for a valid test. For PHEVs that use a capacitor as an energy storage device, (V^2_{initial}) is the square of the capacitor

voltage stored at the beginning of the Quick Drive-Away Emission Test, and (V_{final}) is the stored capacitor voltage at the end of the Quick Drive-Away Emission Test. The final stored capacitor voltage, (V_{final}) , shall not exceed either $(V_{\text{final}})_{\text{max}}$ or $(V_{\text{final}})_{\text{min}}$ for a valid test. For PHEVs that use an electro-mechanical flywheel as an energy storage device, $(\text{rpm}^2_{\text{initial}})$ is the squared flywheel rotational speed at the beginning of the Quick Drive-Away Emission Test, and $(\text{rpm}_{\text{final}})$ is the flywheel rotational speed at the end of the Quick Drive-Away Emission Test. The final flywheel rotational speed, $(\text{rpm}_{\text{final}})$, shall not exceed either $(\text{rpm}_{\text{final}})_{\text{max}}$ or $(\text{rpm}_{\text{final}})_{\text{min}}$ for a valid test.

4.5.4. Alternative End-of-Test Criteria.

With approval from the Executive Officer under the procedure in subsection E.3.2.2, if the End-of-Test Criteria in section E.4.5.3 is not satisfied after the Quick Drive-Away Emission Test, the test may be considered valid if:

4.5.4.1 The alternative End-of-Test criterion of $\pm 5\%$ SOC Net Energy Change Tolerance in Appendix C of SAE J1711 is satisfied (Note: Appendix C of SAE J1711 may not be used to correct measured values for any emissions.); or

4.5.4.2 The SOC at the end of the Quick Drive-Away Emission Test is higher than the SOC at the beginning of the Quick Drive-Away Emission Test.

4.5.5. Determining Hot-Start Emissions.

Conduct an Urban Charge-Sustaining Emission Test as described in subsection E.4.2 to determine hot-start emissions.

4.5.6. Quick Drive-Away Test Emissions Calculations.

To be conducted pursuant to 40 CFR §1066.820 [October 25, 2016] with the following revisions:

4.5.6.1 Amend Subparagraph (a) as follows: Determine the mass of exhaust emissions of each pollutant for each test interval in Subsection E.4.5.6.2 as described in §1066.605.

4.5.6.2 Amend Subparagraph (b) as follows: Calculate the final composite gaseous test results as a mass-weighted value, $e_{\text{quick_drive_away}}$, in grams per mile, using the following equation:

m_{qd} = the mass emissions determined from the Quick Drive-Away Emission Test in subsection E.4.5.3, in grams. If the Quick Drive-Away Emission Test consists of phase 1 cold transient emissions and phase 2 cold stabilized emissions, then sum phase 1 and phase 2 emissions to determine m_{qd} .

Where: m_{qd} = the mass emissions determined from the Quick Drive-Away Emission Test in subsection E.4.5.3, in grams. If the Quick Drive-Away Emission Test consists of phase 1 cold transient emissions and phase 2 cold stabilized emissions, then sum phase 1 and phase 2 emissions to determine m_{qd} .

m_h = the mass emissions determined from the hot-start UDDS cycle in subsection E.4.5.5, in grams. If the hot-start UDDS cycle consists of phase 3 hot transient emissions and phase 4 hot stabilized emissions, then sum phase 3 and phase 4 emissions to determine m_h .

D_{qd} = the measured driving distance from the Quick Drive-Away Emission Test in subsection E.4.5.3, in miles. If the Quick Drive-Away Emission Test consists of phase 1 distance and phase 2 distance, then sum phase 1 and phase 2 distances to determine D_{qd} .

D_{qd} = the measured driving distance from the Quick Drive-Away Emission Test in subsection E.4.5.3, in miles. If the Quick Drive-Away Emission Test consists of phase 1 distance and phase 2 distance, then sum phase 1 and phase 2 distances to determine D_{qd} .

D_h = the measured driving distance from the hot-start UDDS cycle in subsection E.4.5.5, in miles. If the hot-start UDDS cycle consists of phase 3 distance and phase 4 distance, then sum phase 3 and phase 4 distances to determine D_h .

D_h = the measured driving distance from the hot-start UDDS cycle in subsection E.4.5.5, in miles. If the hot-start UDDS cycle consists of phase 3 distance and phase 4 distance, then sum phase 3 and phase 4 distances to determine D_h .

4.5.6.3 Subparagraph (c). [n/a.]

5. Alternative Urban Emission Test Provisions.

5.1. Requirement to Qualify for the Alternative Urban Emission Test.

A vehicle with an Urban All-Electric Range that is equal to or greater than four UDDS cycles and has an AER/EAER ratio that is equal to or greater than 0.98 may demonstrate compliance with applicable exhaust emission standards using this section E.5 in lieu of sections E.4.2 and E.4.3. The AER and EAER values used to calculate the AER/EAER ratio must each contain three significant figures

after the decimal point. Rounding the calculated AER/EAER ratio up to 0.98 is prohibited. Use of the Alternative Urban Emission Test must be approved in advance by the Executive Officer under the procedure in subsection E.3.2.1. The manufacturer must provide information to demonstrate that the applicable vehicle test group satisfies the requirements outlined in this subsection E.5.1.

* * * *

6. SFTP Emission Test Provisions.

6.1. US06 Charge-Sustaining Emission Test.

To be conducted pursuant to 40 CFR §1066.831 with the following revisions:

6.1.1. Vehicle Preconditioning and Emission Testing.

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

6.1.1.2 Amend subparagraph (b)(1)(i): For aggressive-driving tests that do not follow any urban emission test or the Highway Emission Test.

6.1.1.3 Amend subparagraph (b)(1)(ii): For a test element that starts more than 72 hours after any most recent urban emission test or the Highway Emission Test (with or without evaporative emission measurements).

6.1.1.4 Amend subparagraph (b)(1)(iii): For testing in which the test vehicle has not remained in an area where ambient temperatures were within the range specified for testing since any previous urban emission test or the Highway Emission Test.

6.1.1.5 Subparagraphs (b)(2) through (b)(3)(i). [No change.]

6.1.1.6 Amend subparagraph (b)(3)(ii): Delete the following "For our testing, we will generally operate the vehicle over the same preconditioning cycle that will be used for testing in this section.", and add the following " The vehicle shall be in charge-sustaining operation for this preconditioning drive. If driver-selectable modes are available, do not activate the driver-selectable mode to be tested for the preconditioning drive, but set the vehicle in default mode or normal mode for the preconditioning drive with the vehicle in charge-sustaining operation. If, however, the vehicle is to be tested in charge-increasing operation (this does not apply to a driver-selectable charge-increasing mode),

then the initial SOC shall be set at the lowest normal SOC level allowed by the vehicle when driving on the UDDS cycle.”.

6.1.1.7 Subparagraphs (b)(3)(ii)(A) through (b)(3)(ii)(B). [No change.]

6.1.1.8 Amend subparagraph (b)(3)(ii)(C): The HFEDS cycle.

6.1.1.9 Subparagraphs (b)(3)(ii)(D) through (e). [No change.]

6.1.1.10 Amend subparagraph (e)(1): Following the preconditioning specified in paragraph (b) of this section, place the vehicle in gear and simultaneously start sampling and recording. If a driver-selectable mode is to be tested following the preconditioning, activate the driver-selectable mode, place the vehicle in gear, and simultaneously start sampling and recording. Begin the first acceleration 5 seconds after placing the vehicle in gear.

6.1.1.11 Subparagraphs (e)(2) through (e)(2)(iii). [No change.]

6.1.1.12 Amend subparagraph (e)(3): Turn the vehicle off 2 seconds after the end of the last deceleration. Five seconds after the vehicle stops running, stop all sampling and recording, including background sampling. Stop any integrating devices and indicate the end of the test cycle in the recorded data. Note that the 5 second delay is intended to account for sampling system transport.

6.1.1.13 Subparagraph (e)(4). [No change.]

* * * *

7. 50°F And 20°F Emission Test Provisions.

7.1. 50°F and 20°F Emission Test.

7.1.1 50°F testing shall be conducted pursuant to subsections E.4.1 to E.4.3 with the modifications in Part II, Section C 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 additional following revisions in section E.8.2.

7.1.2 20°F testing shall be conducted pursuant to subsections E.4.1 to E.4.3 with the modifications in Part II, Section B Subpart H 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 additional following revisions in section E.8.2.

7.2. Revisions for 50°F and 20°F Testing.

7.2.1. Vehicle Charging

For 50°F and 20°F charge-depleting testing, vehicle charging, prior to emissions testing, shall be performed during the soak period at 50°F and 20°F, respectively.

7.2.2. SOC Net Energy Change Tolerances.

For the 50°F and 20°F emission tests, a vehicle is not required to meet SOC net energy change tolerances.

7.2.3. 50°F and 20°F Charge-Depleting Emission Test.

If measurement of worst case emissions requires the Urban Charge-Depleting Emission Test to be performed, the vehicle shall be preconditioned and fully charged. The continuous urban test schedule shall then be performed. The UDDS cycle, in which the auxiliary power unit first starts, shall be the cold UDDS cycle. Emissions shall be sampled according to one of the options in section E.8.2.4. For the three phase test option, if the auxiliary power unit starts in phase two of the UDDS cycle, phase one emissions are considered zero for emission calculation purposes. Emissions are weighted according to section E.8.2.4.

7.2.4. 50°F and 20°F Charge-Sustaining Emission Test.

If the worst case for emissions is charge-sustaining operation, the vehicle shall be preconditioned, and one of the following two emission test options must be performed.

7.2.4.1 A three phase test that includes phase one as the first 505 seconds of the UDDS cycle, phase two as 506 seconds to the end of the UDDS cycle, a 10 minute key-off soak period, and phase three the first 505 seconds of the UDDS cycle. The first two phases test shall be counted as the first UDDS cycle and the second and third phases will constitute the second UDDS cycle. Emission weighting is as follows:

$$Y_{wm} = 0.43 * \left(\frac{Y_1 + Y_2}{D_1 + D_2} \right) + 0.57 * \left(\frac{Y_2 + Y_3}{D_2 + D_3} \right)$$

- Where:
- Y_2 = Mass emissions as calculated from phase two of the three phase test, in grams.
 - Y_1 = Mass emissions as calculated from phase one of the three phase test, in grams.
 - Y_3 = Mass emissions as calculated from phase three of the three phase test, in grams.
 - Y_2 = Mass emissions as calculated from phase two of the three phase test, in grams.
 - Y_{wm} = Weighted mass emissions of each pollutant, i.e., THC, CO, THCE, NMOG, NMHC, CH₄, NO_x, or CO₂, in grams per vehicle mile.
 - D_1 = The measured driving distance from phase one of the three phase tests, in miles.
 - Y_3 = Mass emissions as calculated from phase three of the three phase test, in grams.
 - D_2 = The measured driving distance from phase two of the three phase tests, in miles.
 - D_1 = Mass emissions as calculated from phase one of the three phase tests, in grams.
 - D_3 = The measured driving distance from phase three of the three phase tests, in miles.
 - D_2 = Mass emissions as calculated from phase two of the three phase tests, in grams.
 - D_3 = Mass emissions as calculated from phase three of the three phase tests, in grams.
 - D_1 = The measured driving distance from phase one of the three phase tests, in miles.
 - D_2 = The measured driving distance from phase two of the three phase tests, in miles.
 - D_3 = The measured driving distance from phase three of the three phase tests, in miles.

7.2.4.2 A two phase test that includes phase one as a UDDS cycle, a 10 minute key-off soak period, and phase two as a UDDS cycle. Emission weighting will follow the procedure outlined in section E.4.2.5 or section E.4.3.6.

7.2.5. 50°F and 20°F Alternative Urban Emission Test.

If a vehicle qualifies for the Alternative Urban Emission Test, the 50°F and 20°F emission test shall be performed using the Alternative Urban Emission Test in section E.5 in lieu of the Urban Charge-Depleting Emission Test or Urban Charge-Sustaining Emission Test.

* * * *