State of California
AIR RESOURCES BOARD

Notice of Public Availability of Modified Text

PUBLIC HEARING TO CONSIDER PLUG-IN HYBRID ELECTRIC VEHICLE TEST PROCEDURE AMENDMENTS AND AFTERMARKET PARTS CERTIFICATION REQUIREMENTS ADOPTION

Public Hearing Date: January 23, 2009
Continuation Hearing Date: May 28, 2009
Public Availability Date: August 28, 2009
Deadline for Public Comment: September 14, 2009

At its January 23, 2009, public hearing, the Air Resources Board (ARB or Board) approved the adoption of amendments to California Code of Regulations, title 13, sections 1961, 1962, 1962.1, 1976 and 1978, and to the incorporated "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles", **"**California Exhaust Emission Standards and Test Procedures for 2005 through 2008 Model Zero-Emission Vehicles, and 2001 through 2008 Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes", "California Exhaust Emission Standards and Test Procedures for 2009 and Subsequent Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes", "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles", and "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles".

The approved amendments to the regulations and test procedures primarily adapt current exhaust and evaporative emission test procedures so that they more accurately reflect the exhaust and evaporative emissions generated from new configurations of plug-in hybrid electric vehicles.

At the hearing, the Board adopted Resolution 09-6, in which it approved the originally proposed amendments with several modifications. Some of the modifications had been suggested by staff in a document entitled "Staff's Proposed Regulatory Text Modifications" that was distributed at the hearing and that was Attachment G to the Resolution. The Resolution and Attachment G are available at ARB's website for this rulemaking: http://www.arb.ca.gov/regact/2008/phev09/phev09.htm. The Resolution directed the Executive Officer to incorporate the modifications into the proposed regulatory text, with such other conforming modifications and technical amendments as may be appropriate, and to make the modified text available for a supplemental comment period of at least 15 days.

The Board also directed the Executive Officer and staff to return to the Board after consulting with affected conversion system manufacturers and others related to systems for conversions to off-vehicle charge capable hybrid electric vehicles (more commonly referred to as plug-in hybrid electric vehicles (PHEVs)) in several months to continue the Board's consideration of the proposed adoption of section 2032, title 13, California Code of Regulations and its incorporated procedure – the "California Certification and Installation Procedures for Off-Vehicle Charge Capable Conversion Systems for 2000 and Subsequent Model Year Hybrid Electric Vehicles".
This portion of the rulemaking establishes certification procedure requirements that provide PHEV manufacturers greater flexibility and create a phased approach to certification that encourages development of such conversion systems. The Board then continued the January 23, 2009 public hearing until May 28, 2009.

At its May 28, 2009 public hearing, staff presented a Supplemental Staff Report entitled "Proposed Rulemaking for Plug-in Hybrid Electric Vehicles, Modifications to the Proposed Aftermarket Parts Certification Requirements," and the Board adopted the proposed adoption of California Code of Regulations, title 13, section 2032 and the incorporated "California Certification and Installation Procedures for Off-Vehicle Charge Capable Conversion Systems for 2000 and Subsequent Model Year Hybrid Electric Vehicles."

The adopted aftermarket regulation and incorporated certification procedure primarily establish certification procedures that provide PHEV manufacturers greater flexibility and create a phased approach to certification that encourages development of such conversion systems.

The Board adopted Resolution 09-39, in which it approved the proposed regulation and incorporated certification procedure, with several modifications that were detailed in a document entitled "Proposed Regulation Order" that was distributed at the hearing and that was Attachment B to Resolution 09-39. The Resolution and Attachment B are available at ARB's website for this rulemaking: http://www.arb.ca.gov/regact/2008/phev09/phev09.htm. The Resolution directed the Executive Officer to incorporate the modifications into the proposed regulatory text, with such other conforming modifications and technical amendments as may be appropriate, and to make the modified text, the Supplemental Staff Report as set forth in Attachment C, and any additional supporting documents and information as may be appropriate, available for public comment for a period of 15 days,

Attachment 1 to this notice contains the text of California Code of Regulations, title 13, section 1962.1 that shows the proposed 15-day modifications to the originally proposed regulations relating to exhaust emissions.

Date of Release of the Initial Statement of Reasons:	December 5, 2008
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Attachment 2 to this notice contains the text of the "California Exhaust Emission Standards and Test Procedures for 2009 and Subsequent Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes" that shows the proposed 15-day modifications to the originally proposed amendments relating to exhaust emissions test procedures.

Attachment 3 to this notice contains the text of "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles" that shows the proposed 15-day modifications to the originally proposed amendments relating to evaporative emissions test procedures.

Attachment 4 to this notice contains the text of "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," that shows the proposed 15-day modifications to the originally proposed amendments relating to refueling emission standards and test procedures.

Attachment 5 to this notice contains the text of the incorporated "California Certification and Installation Procedures for Off-Vehicle Charge Capable Conversion Systems for 2000 and Subsequent Model Year Hybrid Electric Vehicles" that shows the proposed 15-day modifications to the originally proposed certification procedures relating to aftermarket certification of PHEV conversion systems.

The rationale for the modifications to the regulations and incorporated test and certification procedures is set forth below.

I. Modifications to Regulatory Text and Test Procedures Relating to Exhaust Emission Test Procedures

A. Modifications to Regulatory Text of California Code of Regulations, Title 13, Section 1962.1 Being Made Available for Comment

At the January 23, 2009, Board hearing, staff proposed modifications to section C.3.3 of the "California Exhaust Emission Standards and Test Procedures for 2009 and Subsequent Model Zero-Emission Vehicles, and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," to reflect the proposed changes to the testing procedure for plug-in hybrid electric vehicles. At that time, these changes should also have been proposed for California Code of Regulations, Title 13, Section 1962.1, subparagraph (c)(3)(A). However, they were

erroneously omitted. This 15-day change incorporates the changes to the "California Exhaust Emission Standards and Test Procedures for 2009 and Subsequent Model Zero-Emission Vehicles, and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes" that were adopted by the Board in January into California Code of Regulations, Title 13, Section 1962.1, subparagraph (c)(3)(A).

The changes proposed align the regulation terminology and requirements with the test procedure. In addition, the original reference to the Society of Automotive Engineers (SAE) utility factor was a draft procedure, staff has updated the reference to include the procedure adopted by SAE.

B. Modifications to the Test Procedure as Renamed and Incorporated by Reference "California Exhaust Emission Standards and Test Procedures for 2009 and Subsequent Model Zero-Emission Vehicles, and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," Incorporated by Reference in California Code of Regulations Section 1962.

Two substantive modifications to these test procedures are discussed below.

1. Section D.2.11 – ARB is requesting information to be reported for certification to clarify how the vehicle and battery break-in periods were determined by the manufacturer. Previously it was only implied that manufacturers supply battery break-in information, because this information was contained in section E.2 and F.2 of the test procedures. Now it is required for certification. This information will be information for understanding in-use battery durability.

2. Section E.3.1.2(a) and E.3.2.2(a) – In the current test procedures, a manufacturer is required to determine the urban and highway all-electric range for a fuel cell vehicle and a hybrid fuel cell vehicle by filling the hydrogen tank and running the vehicle over the applicable test cycle until the vehicle is no longer able to maintain the required speed and/or acceleration. However, establishing range using the all-electric range test was not formally specified in the test procedure for fuel cell vehicles. Because the end of the test does not occur until the fuel tank is drained, this is a time consuming test. In order to reduce the testing time for these types of vehicles, staff originally proposed that the urban and highway all-electric range for a fuel cell vehicle and a hybrid fuel cell vehicle be determined in accordance with the recently adopted Society of Engineers test protocol, SAE J2572. Since the release of the 45-day notice, manufacturers have requested that they be given the option of using either the original test procedure or SAE J2572 to determine the urban and highway all-

electric range for a fuel cell vehicle and a hybrid fuel cell vehicle. This proposed modification allows both options to be used.

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Minor, Non-Substantive Changes

Additional modifications provide clarification, such as directing manufacturers to the correct procedures for each model year, or additional language to clarify procedures; eliminate redundancies with the federal regulations; update cross references; correct terminology; update the adopted SAE reference from the draft version; and correct typographical errors. These modifications are discussed below.

1. Section B.1 – changes to definitions. "Repeated" was removed since it appears to be redundant. Soak time was changed from 20 to 30 minutes to allow some manufacturers more time to recycle analytical equipment. "Accurate" was removed from range reporting since it is appears to be an unnecessary qualifier.

2. Section C.3.3 – update the procedure used to determine the utility factor to correspond with the final version of the SAE J2841 procedure.

3. Section E.3.1.1(d) – (requirement eliminated) The reference to off-vehicle charge capable hybrid electric vehicles was made in error.

4. Section E.3.2.1(b) – (change in testing requirement) The vehicle was not to be "Driven" to the dynamometer to perform the highway all-electric range test as this would in itself deplete the battery and reduce range. This was understood, but it was carry-over language from running the highway fuel economy emissions test procedure which specifies "driving" the vehicle to the dynamometer since the vehicle needs to be tested in a hot condition.

5. Section E.3.3(e) and Section F.3.1 – (reporting accuracy requirement) <u>(e) Measured AC and DC watt hours and amp hours shall be reported to the nearest hundredths of a kilowatt hour and tenths of an amp hour.</u> This section was included to establish an accuracy requirement where none existed before.

6. Section E.3.5 – (clarifying requirement) <u>AC/DC volts and amps</u> are being specified to minimize ambiguity, although in context it is implicit what is being referred to.

7. Section E.3.6 – (addition of formula) This formula is included to avoid ambiguity over how AC energy is calculated as has already been done for DC energy.

8. Section E.6.2.1 – (use of bag mini-diluter) The procedure was updated to include the use of the bag mini-diluter as an alternative for clarity. However, the bag mini-diluter is presently permitted for all light duty vehicles testing as an

alternative to the constant volume sampling system in a manufacturer advisory correspondence.

9. Section E.6.2.3 – (keep section) "Practice" runs are allowed by the CFR and do not need to be stricken.

10. Section E.7.2.7(i) – (change reference) This is a CFR reference clean up correcting an error.

11. Section E.8.2.6.2(i) – (change in testing requirement) The reference to preconditioning cycle has been eliminated to add clarity to the requirement that the US06 test normally includes the preconditioning cycle, but is not required here. It was never intended to run multiple US06 cycles with a preconditioning cycle for each.

12. Section E.8.4.4.1 – (changes to SC03 test requirements) Minor grammatical changes, added tolerance to hot soak time at request of the manufacturers.

13. Section E.9.1 – (change to definition) Definition of “bus voltage” changed to “open circuit voltage that corresponds to the SOC of the target SOC during charge sustaining operation” at the request of the manufacturers. This change has little impact on the way the vehicle is tested, and only affects the reported parameter and how it is derived. ARB concurs that the new method for calculating the traction battery voltage is necessary and acceptable.

14. Section F.3.1 – (changes to reporting requirements) Clarifying changes to specify which tests are applicable for electrical data recording requirements, and measurement tolerance added.

15. Section F.3.3 – (clarifying requirement) AC/DC volts and amps are being specified to minimize ambiguity, although in context it is implicit what is being referred to.

16. Section F.3.4 – (addition of formula) This formula is included to avoid ambiguity over how AC energy is calculated as has already been done for DC energy.

17. Section F.5 – (clarifying requirement) Clarifications are made to specify that emissions are calculated under worst case emission conditions instead of maximum operation of the auxiliary power unit for vehicles with more than one operating mode.

18. Section F.5.1.5 – (numbering change).

19. Section F.5.2.1 – (use of bag mini-diluter) The procedure was updated to include the use of the bag mini-diluter as an alternative for clarity. However, the bag mini-diluter is permitted for all light-duty vehicles testing as an alternative to the constant volume sampling system in a manufacturer advisory correspondence. MAC #2002-02

20. Section F.5.2.3 – (keep section) "Practice" runs are allowed by the CFR and do not need to be stricken.

21. Section F.5.4.3 – (change in testing requirement) This statement clarifies how emissions will be calculated if charge capable HEVs have no charge depleting hot cycles.

22. Section F.5.6.1 – (change in calculation) This statement clarifies how emissions will be calculated if charge capable HEVs have no charge depleting hot cycles.

23. Section F.6.1 – (correction of test name made in error).

24. Section F.6.2.2.2 – (Clarification) Both the Highway Charge Depleting Range test and the Highway Charge Sustaining Emissions tests are conducted from a cold start condition. “Driven” to the dynamometer was removed as it will warm up the vehicle just prior to the test and is inconsistent with the new test procedure.

25. Section F.6.2.2.6 - Additional text was recommended by the manufacturers to clarify that emissions sampling is required during all highway charge depleting range and charge sustaining emissions tests, because the emissions data may be needed for calculations. For non-off board charge capable HEVs, emission measurement may be omitted during the first of two highway tests. This is consistent with the end of section 7.4.1.

26. Section F.6.2.2.8 – This is a CFR reference clean up correcting an error.

27. Section F.6.3.3 – (editorial) corrects error in reference to Section F6.3.4. Manufacturers are allowed to request to extend the time to charge to three hours to accommodate laboratory schedules. Removed separate reference to F6.3.4

28. Section 7.2.1 - Removed second US06 after preconditioning used for emissions for clarity. It is defined in more detail later in the procedure.

29. Section F.7.2.6.2 – (change in testing requirements) Clarifying statements added to remove preconditioning cycle from the US06 if additional US06 tests are needed to satisfy SOC requirements. Changed from two to three US06 cycles needed to meet SOC requirements at manufacturers' request.

30. Section F.7.4.1 – (change in testing requirements) Removed "The second US06 after preconditioning is used for emissions…" for clarity. This is defined in more detail later in the procedure.

31. Section F.7.4.3 – (deletion of testing requirements) Language from US06 test was added to SC03 test requirements in error.

32. Section F.7.4.4.1 – (change in testing requirements) Added clarifying text and tolerances to soak time to make the procedure for non-off board charge capable HEVs consistent with off-board capable charged HEVs as in section E 8.4.4.1. These changes are consistent with ARB's intention for non-off board charge capable HEVs be tested in the same was as off-board capable charged HEVs to meet SCO3 requirements.

33. Section F.7.5.2 – (change in testing requirements) Correction made to be consistent with CFR speed tolerances, and other clarifying changes.

34. Section F.8.1 – (change in testing requirements) Changed reference from NMHC to NMOG to be consistent with the LEV emission standards for the cold 20 deg F and 50 deg F tests. Corrected names of the charge depleting range test and the charge sustaining emissions test.

35. Section F.8.2 – (clarifying change) Removed reference to preconditioning in section 5.1 at the request of the manufacturer. The change will remove a fuel drain and fill requirement. This is not expected to have a major impact on the cold temperature emissions test. Clarified that only one of parts (i) or (ii) need to be completed.

36. Section F.10.1 – (change to definition) Definition of "bus voltage" changed to "open circuit voltage that corresponds to the SOC of the target SOC during charge sustaining operation" at the request of the manufacturers. This change has little impact on the way the vehicle is tested, and only affects the reported parameter and how it is derived. ARB concurs that the new method for calculating the traction battery voltage is necessary and acceptable.

37. Section F.11.4 – (change to definition) Clarify reference for Mcs and Mcd definitions in previous in sections F.11.2 and F.11.1.

38. Section F.11.5 – (change to definition, deletion of formula) Clarify reference for Mcs and Mcd definitions in previous in sections F.11.3 and F.11.1.

39. Section F.11.8 – (change to definition) Definition of "bus voltage" changed to "open circuit voltage that corresponds to the SOC of the target SOC during charge sustaining operation" at the request of the manufacturers. This change has little impact on the way the vehicle is tested, and only affects the reported parameter and how it is derived. ARB concurs that the new method for calculating the traction battery voltage is necessary and acceptable.

40. Section F.11.9 – (clarifying change) Clarifying language added to report range data.

41. Section F.11.11 – (change to definition) Definition of bus voltage changed to open circuit voltage at the request of the manufacturers.

42. Section I.6.2.2 – (keep section)
The "practice" runs are allowed by the CFR and do not need to be stricken.

43. Section I.8.4.6 – (change to test required and soak period) Corrected error. Now states SC03 correctly instead of US06. Tolerance on hot soak time included.

44. Section I.9.1 – (change to definition) Definition of "bus voltage" changed to "open circuit voltage that corresponds to the SOC of the target SOC during charge sustaining operation" at the request of the manufacturers. This change has little impact on the way the vehicle is tested, and only affects the reported parameter and how it is derived. ARB concurs that the new method for calculating the traction battery voltage is necessary and acceptable.

II. Modifications to Test Procedures Relating to Evaporative Emission Test Procedures Being Made Available for Comment

A. "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," adopted August 5, 1999, as last amended May 2, 2008, Incorporated by Reference in California Code of Regulations, Title 13, Section 1976

Substantive Changes

1. As proposed, the running loss fuel tank temperature profile determination is not consistent with the running loss test. Modifications were made to clarify the requirements of section III.C.1.3.

2. The reference to 40 CFR 86.132-90 is outdated. The reference is updated in the procedure to 40 CFR 86.132-00, in sections III.D.1.5, III.D.1.6, III.D.3.2, and III.D.3.3.

Items 3 through 10 refer to off-vehicle charge capable hybrid electric vehicles, that are equipped with non-integrated refueling canister-only systems.

3. The intent of the existing language in section II.A.5.4 was to provide some level of assurance that the evaporative emission control systems will be purged, at some point, so that subsequent tank refill events do not cause canister breakthrough. However, staff now recognizes that using the supplemental two-day diurnal plus hot soak test sequence, or even the optional engineering evaluation, for demonstrating this capability is not dependable. The driving distance traveled during the test sequence's exhaust test does not provide adequate amounts of purging opportunities due to these vehicle's particular battery-charge operational mode design (i.e., blended mode or all-electric mode), and even with its required operation at the low battery state-of-charge level. Thus, during the test sequence, a refueling canister will likely experience either no purge or only a partial purge, and thereby fail to demonstrate the capability to sufficiently purge the canister. A better criterion for evaluating this purge capability would be to drive the vehicle for a longer period so the canister can experience more purging opportunities. Such long driving events already occur with the vehicle drivedowns when conducting the ORVR test sequence, in which a vehicle consumes 85% of its fuel tank capacity. This test, along with a manufacturer's own related development work, should provide a manufacturer with an expert understanding of its own evaporative canisters' purging capability.

Accordingly, staff proposes to clarify the current provision with respect to vehicles that are equipped with non-integrated refueling canister-only systems. Specifically, a manufacturer of such vehicles could attest that the system's canister will attain a purged condition when the vehicle has consumed at least 85% of its nominal fuel tank capacity. This allowance would be in lieu of conducting the currently optional engineering demonstration, and would be applicable only to systems that inherently allow only refueling vapors to be stored in their canister, and, in which the inherent battery-charge operational mode characteristics cause the canister to experience only either no purge or partial purge during the supplemental two-day diurnal plus hot soak test sequence.

A manufacturer would 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.”

Staff also proposes to eliminate ambiguity in this section by replacing the adverbial phrase “sufficiently purged,” that is used to describe the quality of a canister purge, with the phrase “purged,” because it is implicitly understood that “purged” means “sufficiently purged.”

4. Residual vapor loading from a previous test sequence may cause invalid test results if the canister is not purged prior to the fuel-tank-refill canister-loading step. Therefore another step in the test sequence should be added to establish the initial test state of the canister prior to any vapor loading. This process can be accomplished by performing vehicle drivedowns, such as is done in the ORVR test sequence, in which 85%, or less as determined by the manufacturer, of the vehicle’s fuel tank capacity is consumed. Accordingly, staff proposes to add an additional ORVR-like 95% fuel tank fill and vehicle drivedown step to the test procedures. In order to provide additional flexibility, staff proposes that a manufacturer have the option to accomplish this canister purge by performing a bench purging process instead of by conducting vehicle drivedowns. Approval to use this option will be based on the manufacturer’s 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. In addition, the characteristics of the purge flow through the canister, including the flow rates, will be representative of the flow that occurs under the UDDS cycles that are specified to occur during the vehicle drivedowns. Using this option eliminates the need for the 95% fuel tank fill step that is performed before the vehicle drivedown. Furthermore, a manufacturer will have the option to perform measured drains of a fuel tank in order to achieve the tank fill levels specified in subsequent fuel tank drain and fill steps. Therefore, staff proposes that the appropriate subsections of section III.D.1.7.; section III.D.1.12.2.; sections III.D.3.3.2. and III.D.3.3.2.1.; sections

III.D.3.3.6., III.D.3.3.6.13., and III.D.3.3.6.14., be either modified or added, as applicable, in order to include the additional 95% fuel tank fill and vehicle drivedown steps, as well as the optional bench purge allowance.

Additionally, staff proposes to re-locate the All-Electric Range Test provisions in section III.D.1.14., to section III.D.13., because these tests are actually done prior to the start of the initial fuel drain and fill step in the test sequence. Therefore, these provisions are more appropriately located before those steps in the test procedures.

5. Staff proposes that language be added to the vehicle drivedown specifications of the test procedures in section III.D.1.7.2. to allow for temporary driving suspension for computer reset or driver relief, if a manufacturer chooses to perform a vehicle drivedown of 85% or less of rated fuel capacity.

6. The proposed modification to section III.1.D.7. would allow manufactures the option of using the more stringent 1.5 times working capacity, butane-nitrogen canister preconditioning loading method for exhaust emission testing. This modification reduces the burden on manufacturers without reducing the stringency of the test procedures. The option would only be allowed when performing an exhaust emission testing sequence.

7. Staff is proposing language to expand the fuel dispensing temperature tolerance for the preconditioning only portion of the fuel-tank-refill canister-loading procedures in section III.D.3.3.6.8., of the test procedures. The fuel temperature tolerances specified should be expanded to 67° F +/- 3℉, from 67° F +/- 1.5℉, to provide flexibility for manufacture rs in the testing process. Furthermore, compliance stringency is not affected because ARB will be able to conduct certification confirmatory and in-use compliance testing at the same expanded fuel temperature tolerances.

8. The Running Loss test procedures in sections III.D.8.1.10., and III.D.8.2.5., are modified to clarify that these vehicles can satisfy this requirement using either a separate test or an engineering evaluation.

9. The language in section III.10.3.14, is modified to allow the manufacturers greater flexibility with respect to these vehicles that are equipped with these systems. Specifically, manufacturers of such vehicles should be allowed to satisfy this requirement under the inherent ability of the vehicle's canister system to attain a purged condition when the vehicle has consumed at least 85% of its nominal fuel tank capacity as discussed under item 3.

10. Section III.D.3.3.6 is clarified to specify that the canister shall have already achieved a stabilized state prior to the start of the applicable test sequence, and not prior to the fuel drain and fill step.

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Minor, Non-Substantive Changes

Additional modifications to the evaporative test procedures include clarifying language; such as directing manufacturers to the correct procedures for each model year, or additional language to clarify procedures; eliminate redundancies with the federal regulations; and correct typographical errors.

B. "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," adopted August 5, 1999, as last amended May 2, 2008, Incorporated by Reference in California Code of Regulations, Title 13, Section 1978

The seven main modifications to the Onboard Refueling Vapor Recovery (ORVR) Test Procedures for 2011 and subsequent model year vehicles are listed below:

1. The language on the Appendix F title page will be revised to indicate, "Proposed Amendments to the Onboard Refueling Vapor Recovery Test Procedures."

2. Staff received comments to delete section II.B.4.4.2, the requirement to set the battery state-of charge at the highest level for off-vehicle charge capable hybrid electric vehicles, because the intent of the vehicle drivedown is to consume fuel, and setting the battery state-of-charge at the highest level merely delays the start of the fuel-consumption process.

   However, the intent of section II.B.4.4.2 is to use test conditions that are representative of real-world circumstances. The real-world probability is great that in-use, off-vehicle charge capable hybrid electric vehicle batteries will always be "plugged-in," and thus the batteries levels will always be at high state-of-charge settings prior to vehicle use. Therefore, the "always plugged-in" nature of in-use vehicles would be reflected in the test procedures by setting the battery state-of-charge at the highest level prior to any required vehicle driving that precedes emission testing. In the ORVR Test Procedures, specifically with respect to 2011 and subsequent model-year off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, this situation occurs with the canister-purging vehicle drivedown step that immediately precedes the actual refueling test. Although a result of the vehicle drivedown step is to consume fuel, an unintended result of setting the battery at a high level is to delay starting the engine during the vehicle drivedown step. Nevertheless, even though the high battery setting requirement lengthens the time for completing the test sequence, at this point in the regulatory

development, staff was reluctant to ignore an identifiable test condition factor that may, or may not, ultimately affect the stringency of the emission standards. That being said, staff remained sympathetic to the testing burden caused by the delayed engine operation during the vehicle drivedown step. So the adopted amendments also included an option for a manufacturer, when approved by the Executive Officer, to set the battery state-of-charge at a level that maximizes the amount of engine operation, prior to conducting the vehicle drivedown step, in order to reduce the amount of "wait time" for starting the fuel consumption process. Accordingly, the existing provisions are warranted, and the section is not deleted.

In order to clarify this intent, staff proposes to add language in section II.B.4.4.2.1 indicating that this option applies only as long as the stringency of the emission standards is not compromised, meaning that future in-use test results or other information, will determine the continued validity of the option. Specifically with respect to 2011 and subsequent model-year off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems, staff also proposes to explicitly clarify that the high battery state-of-charge setting is required only for the vehicle drivedown portion of the test sequence that occurs prior to the actual refueling test, and is not required for the vehicle drivedown step that occurs earlier in the test sequence that is conducted to establish the initial testing state of the canister (section II.B.4.1.3.2.).

Items 3 through 7 relate to off-vehicle charge capable hybrid electric vehicles that are equipped with non-integrated refueling canister-only systems.

3. To eliminate residual vapor loading from a previous test sequence which may cause invalid test results an additional step is added for 2011 and subsequent model-year. This additional step is added to purge the canister prior to the fuel-tank-refill canister-loading step and to establish the initial test state of the canister prior to any vapor loading. This process can be accomplished by performing vehicle drivedowns, as specified in the ORVR test sequence, in which 85%, or less as determined by the manufacturer, of the vehicle's fuel tank capacity is consumed. Accordingly, staff proposes to add an additional 95% fuel tank fill step and vehicle drivedown step to the ORVR test. In order to provide additional flexibility, staff proposes that a manufacturer have the option to accomplish this canister purge by performing a bench purging process instead of by conducting vehicle drivedowns. Approval to use this option will be based on the manufacturer's 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. In addition, the characteristics of the purge flow through the canister, including the flow rates, will be representative of the flow that occurs under the UDDS cycles that are specified to occur during the vehicle drivedowns. Using this option eliminates the 95% fuel tank fill step that is performed before the vehicle drivedown. Furthermore, a manufacturer will have the option to perform measured drains of a fuel tank in order to achieve the tank fill levels specified in subsequent fuel tank drain and fill steps. Therefore, staff proposes either the modification or addition, as applicable, of sections II.B. 4.1.2., II.B.4.1.3, II.B.4.1.3.1., II.B.4.1.3.2., II.B.4.1.3.3., II.B.4.1.4., II.B.4.1.5., II.B.4.1.6., II.B.4.1.7., II.B.4.1.7.1., and, II.B.4.1.16; and, sections II.B.4.4., II.B.4.4.2., II.B.4.4.2.1., II.B.4.4.4., II.B.4.4.5., II.B.4.4.6., II.B.4.4.7., II.B.4.4.8., II.B.4.4.9., and II.B.4.4.10., in order to include the additional 95% fuel tank fill and vehicle drivedown steps, as well as the optional bench purge allowance.

4. The additional language in the vehicle drivedown specifications of sections II.B.4.1.3, and II.B.4.4, allows a manufacturer to perform a vehicle drivedown of 85% or less of rated fuel capacity; however, provisions should be included that allow for temporary driving suspension for computer reset or driver relief.

5. For only the preconditioning portion of the fuel-tank-refill canister-loading procedure the fuel dispensing temperature tolerance specified in section II.B.4.1.11, is expanded from 67°F +/- 1.5℉ to 67 °F +/- 3℉, to provide flexibility for manufacturers in the testing process. Furthermore, compliance stringency is not affected because ARB will be able to conduct certification confirmatory and in-use compliance testing at the same expanded fuel temperature tolerances.

6. The charging of an off-vehicle charge capable hybrid electric vehicle battery during the canister loading process, in order to set the highest state-of-charge level prior to the vehicle drivedowns, is a safety concern. This battery charging operation should be performed when fuel vapors are more absent, such as during a vehicle soak period. Therefore, the battery charging step from the canister preconditioning step is moved to the vehicle soak period (sections II.B.4.1.7.1.; and, II.B.4.4.2.).

7. In sections II.B.4.1.2, and II.B.4.1.3, clarifications are necessary to eliminate confusion. Specifically, the canister shall have achieved a stabilized state prior to the start of the applicable test sequence, and not prior to the fuel drain and fill step.

Minor, Non-Substantive Changes

Additional modifications to ORVR test procedures include clarifying language; such as directing manufacturers to the correct procedures for each model year, or additional language to clarify procedures; eliminate redundancies with the federal regulations; and correct typographical errors.

III. Modifications to Certification Procedures Relating to Aftermarket Conversions Being Made Available for Comment

A. Modifications to "California Certification and Installation Procedures for Off-Vehicle Charge Capable Conversion Systems for 2000 and Subsequent Model Year Hybrid Electric Vehicles," Incorporated by Reference in California Code of Regulations, Title 13, Section 2032 Being Made Available for Comment

Substantive Changes

ARB staff returned to the Board at a May 28, 2009 public hearing with modifications to the originally proposed PHEV conversion system certification procedures. These modifications addressed the Board's direction to provide additional flexibility to conversion system manufacturers, while limiting the potential emissions impacts of converted vehicles and addressing the requirements of the anti-tampering regulation.

Staff is proposing a three tier certification process. Tier 1 allows the sale of up to 50 vehicle conversion systems. In the first tier, the conversion system manufacturer's application must address six main criteria: initial durability component data, a durability test plan for the converted vehicle, a consumer manual that shows at least a 3-year or 50,000 mile warranty on the conversion system, a discussion on the process to maintain records of sales and installations, an engineering analysis showing that a conversion does not impact the emissions of the original vehicle, and as part of the sale of the conversion, the consumer must sign a statement acknowledging that the conversion may ultimately result in the potential voiding of their OEM warranty. In addition, conversion system manufacturers must support all versions of their conversions throughout the vehicle's useful life.

Tier 2 allows the sale of up to 100 vehicle conversions. In the second tier, manufacturers must meet the first tier requirements along with three additional criteria: provide an onboard diagnostic compliance plan, submit a consumer manual which shows at least a warranty of 5 years or 75,000 miles, and submit emission test data

which shows that the vehicle meets applicable emission standards, and does not trigger the onboard diagnostics malfunction indicator light (MIL) or diagnostic trouble code (DTC). During the second tier, ARB may perform confirmatory testing to verify the emission test data.

In the third tier, conversion system manufacturers must fully comply with the emission test procedures, among other requirements, to achieve certification. The requirements must be met when a manufacturer has sold 100 vehicle conversions. For this tier, all of the requirements of the previous two tiers must be met along with proof that the following requirements are met:

- The battery durability requirement is completed;
- The durability of the conversion is proven to last through the vehicle's useful life;
- The converted vehicle must fully comply with onboard diagnostics;
- The warranty for the conversion system must go through the remaining OEM warranty or the requirements in the second tier, whichever is longer;
- For conversions adding a supplemental battery, the warranty is reduced for the supplemental battery to the requirements in the second tier, (5 years/75,000 miles); and
- The exhaust-, evaporative-, and on-board-vapor-recovery-refueling emission standards testing for hybrid electric vehicles are satisfactorily completed.

The proposed certification procedures are shown in Attachment 5.

For the third tier, the conversion system certification requirements are similar to what staff proposed at the January Board Hearing with the exception of the warranty. The conversion system warranty originally proposed in the December 5, 2008 Staff Report was equivalent to the OEM warranty: 15 years or 150,000 miles, and 10 years or 150,000 miles for the zero-emission energy-storage device. The adopted certification requirements require a 5 year or 75,000 mile warranty or the remaining OEM warranty whichever is greater for the third tier, thus reducing the warranty requirements.

The compliance flexibility of the tiered certification procedure applies to the manufacturer and not to individual conversion system designs. Therefore, a manufacturer may choose to submit multiple applications for different conversion system designs; however, only fifty total conversions per manufacturer can be certified under Tier 1. This allows each company to make a decision on how many systems to develop and what will best serve the company's goals. After 5000 vehicles are converted industry-wide, Tier 1 and Tier 2 options are no longer available. This limits and controls the overall potential emissions and economic impacts for the tiers as will be discussed in the next section.

The tiered certification process provides additional flexibility that is balanced with the

potential impacts to air quality and the economy. The flexibility is provided to encourage the conversion system industry to certify vehicles and, therefore, operate legally in California. As product sales increase, staff anticipates conversion system manufacturers will have the resources to meet each tier of certification requirements.

Table 1 on the following page summarizes the adopted tiered certification of PHEV conversions.

Date of Release of the Initial Statement of Reasons: December 5, 2008
Date of Initial Board Hearing: January 22-23, 2009
Date of Release of Supplemental Staff Report: May 12, 2009
Date of Second Board Hearing: May 28-29, 2009
Date of 15 day Notice Period: August 28, 2009 - September 14, 2009

Table 1: Tier Requirements

Tier[†]	Number of systems that can be sold in the tier[1]	Requirements prior to sale in the tier	Action items to proceed to next tier
1	0-50	1. Application (see below for items to be included) 2. Engineering analysis showing no impact on emissions (specifically canister purge and cold starts) 3. Submit durability test plan[2] and initial durability data (component and in-use)[3] 4. System Warranty 3yr/50K mi 5. Installation Warranty 3yr/50K mi 6. ARB approval of engineering analysis & submittal prior to exemption/sale 7. System supported throughout the vehicle's useful life	1. Conduct emission tests. 2. Develop process for compliance with OBD. 3. Maintain record of sales/installations. 4. Durability test plan begins for their vehicle[3]
2	51-100	1. Application for Tier 2 2. Emission test data 3. Show that durability testing has begun[3] 4. Show of readiness indicators set and no OBD MIL/ DTC during emission tests 5. OBD compliance plan 6. System warranty: 5yr/75K mi 7. ARB may perform confirmatory testing to verify emission test data. If requested, provide test vehicle. 8. ARB approval of submittal prior to exemption/sale	1. Start OBD compliance process. 2. Maintain record of sales/installations. 3. Continue durability testing
3	101+	1. Application for Tier 3 2. Durability test data to vehicle useful life[3] 3. Battery durability/test data 4. OBD approval 5. System warranty: 5yr/75K mi or remaining OEM warranty, whichever is longer 6. Supplemental battery warranty: 5 yr/75K mi 7. ARB approval of submittal prior to exemption/sale	1. ARB will begin in-use testing. If requested, conversion manufacturers provide converted vehicles[3]. 2. Maintain record of sales/installations.

[†] The tiered system ends and is no longer available for any manufacturer after a cumulative total from all manufacturers reaches 5000 vehicle conversion kits. For the 5001st vehicle conversion and all conversions thereafter, all manufacturers must meet the full certification requirements in the regulation. OBD compliance flexibility is still available under the OBD regulations.

[1] The experimental permit process allows manufacturers to produce a prototype system and test up to 5 vehicles. Manufacturers must apply for the permits and the vehicles cannot be sold.
[2] Plan must be for useful life of vehicle.
[3] Up to 5 vehicles temporarily needed for in-use testing.

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To address these changes the following sections within the certification procedure were modified:

1. Section 2, Definition – add the definition of a small volume off-vehicle charge capable conversion system manufacturer, including the distinguishing feature of a Tier 1 and a Tier 2 small volume manufacturer.

2. Section 3(c)(ii) – add a requirement for the supplemental label to include a “Tier 1” or “Tier 2” notation, as appropriate.

3. Section 3(e), Warranty Notification – add a requirement for OVCC conversion system manufacturer to provide notification to its purchaser that installation of the conversion system may affect its original vehicle warranty.

4. Section 3(f) – add a requirement for a small volume manufacturer to report installation information on a quarterly basis to ARB.

5. Section 4(b)(ii) – add a sample of the warranty notification in items to be submitted for a conversion system certification application.

6. Section 5(b) – add clarification that any conversion system must be durable and supported for the useful life of the vehicle.

7. Section 5.(e)(i) and (ii) - add special requirements for small volume manufacturers in lieu of full demonstration of durability, emissions and OBD II compliance.

8. Section 7(a) – revised warranty requirements for Tier 3 certified kits with warranty coverage for 5 years/75,000 miles or the remaining OEM warranty, whichever is greater.

9. Section 7(b) – add a special warranty provision for a supplemental battery conversion system, and for the purpose of this provision, defines what a supplemental battery conversion system means.

10. Section 7(c) - add special warranty requirements for small volume manufacturers.

11. Section 7(d) – reduced the warranty requirements of installers to 3 years/50,000 miles.

12. Section 8 – add provision for ARB to conduct confirmatory testing to confirm test

results submitted by conversion manufacturers.

13. Section 9 – clarify that small-volume manufacturers are not subject to in-use testing requirements.

Minor, Non-Substantive Changes

Additional modifications to certification test procedures include clarifying language; such as correct typographical errors and updating references.

Modified Text Being Made Available

Staff has prepared regulatory text that includes the Board's approved and directed modifications and other conforming modifications needed to clarify regulatory intent. Attachments include regulatory modifications to title 13 in Attachment 1, exhaust test procedures in Attachment 2, evaporative test procedures in Attachment 3, ORVR test procedures in Attachment 4, and certification procedures for conversion systems in Attachment 5. These documents as well as the regulatory documents for this rulemaking are available online at the following ARB website:

http://www.arb.ca.gov/regact/2008/phev09/phev09.htm

Comments and Subsequent Action

In accordance with section 11346.8 of the Government Code, the Board directed the Executive Officer to amend sections 1961, 1962, 1962.1, 1976, 1978, title 13, CCR, and the incorporated "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles", **"**California Exhaust Emission Standards and Test Procedures for 2005 through 2008 Model Zero-Emission Vehicles, and 2001 through 2008 Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes", "California Exhaust Emission Standards and Test Procedures for 2009 and Subsequent Model Zero-Emission Vehicles and Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes", "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles", and "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles", after making the modified text available to the public for comment for a period of at least 15 days. The Board further provided that the Executive Officer shall consider such written comments as may be submitted during this period, shall make such modifications as may be appropriate in light of the comments received, and shall present the regulations to the Board for further consideration if warranted.

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In accordance with section 11346.8 of the Government Code, the Board also directed the Executive Officer to adopt new section 2032, title 13, CCR, and the incorporated "California Certification and Installation Procedures for Off-Vehicle Charge Capable Conversion Systems for 2000 and Subsequent Model Year Hybrid Electric Vehicles", after making the modified text available to the public for comment for a period of at least 15 days. The Board further provided that the Executive Officer shall consider such written comments as may be submitted during this period, shall make such modifications as may be appropriate in light of the comments received, and shall present the regulations to the Board for further consideration if warranted.

Written comments on the modifications approved by the Board may be submitted by postal mail or electronic mail as follows:

Postal mail: Clerk of the Board, Air Resources Board
1001 I Street, Sacramento, California 95814

Electronic submittal: http://www.arb.ca.gov/lispub/comm/bclist.php

Please note that under the California Public Records Act (Government Code section 6250 et seq.), your written and oral comments, attachments, and associated contact information (e.g., your address, phone, email, etc.) become part of the public record and can be released to the public upon request. Additionally, this information may become available via Google, Yahoo, and any other search engines.

In order to be considered by the Executive Officer, comments must be directed to ARB in one of the three forms described above and received by the ARB by 5:00 p.m. on the deadline date for public comment listed at the beginning of this notice. Only comments relating to the above-described modifications to the text of the regulations shall be considered by the Executive Officer.

Attachments

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