

Appendix A-6

Proposed Regulation Order

Section 1962.5

[Note: The entire text of sections 1962.5 set forth below is new language in “normal type” proposed to be added to title 13, California Code of Regulations]

Title 13. Motor Vehicles

Division 3. Air Resources Board

Chapter 1. Motor Vehicle Pollution Control Devices

Article 2. Approval of motor vehicle pollution Control Devices (New Vehicles)

Section 1962.5. Data Standardization Requirements for 2026 and
Subsequent Model Year Light-Duty Zero Emission Vehicles
and Plug-in Hybrid Electric Vehicles

Proposed Regulation Order

Title 13 California Code of Regulations

Adopting new regulatory text: Adopt Section 1962.5 of title 13 California Code of Regulations, to read as follows:

§ 1962.5 Data Standardization Requirements for 2026 and Subsequent Model Year Light-Duty Zero Emission Vehicles and Plug-in Hybrid Electric Vehicles

- (a) Applicability. The requirements of this section shall apply to light-duty zero emission vehicles (ZEV) and plug-in hybrid electric vehicles (PHEV) certified for sale in California as follows:
- (1) At least 40 percent of a manufacturer's 2026 model year ZEVs and 100 percent of a manufacturer's 2027 and subsequent model year ZEVs shall meet the requirements of this section.
 - (2) At least 40 percent of a manufacturer's 2026 model year PHEVs and 100 percent of a manufacturer's 2027 and subsequent model year PHEVs certified to earn vehicle values in accordance with title 13, CCR, section 1962.4 shall meet the requirements of subsections (c)(4)(A)2. and (c)(6).
 - (3) The phase-in percentages of subsections (a)(1) and (a)(2) shall be based on the manufacturer's projected sales volumes for all ZEVs and for all PHEVs projected to be certified to earn vehicle values in accordance with title 13, CCR, 1962.4, respectively. Manufacturers shall submit phase-in plans demonstrating compliance with these percentage requirements prior to submittal of a certification application to CARB for any 2026 model year vehicle.
 - (4) A manufacturer may utilize an alternative phase-in to the required phase-in of subsection (a)(1) or (a)(2) as long as it satisfies the following two requirements: (i) the total compliance calculation for the alternative phase-in schedule according to the method below must sum to be equal to or greater than 180 by the end of the 2027 model year, and (ii) 100 percent of the manufacturer's vehicles subject to the phase-in must meet the requirements of this section in 2028 and subsequent model years. The total compliance calculation for the alternative phase-in is determined by multiplying the percent of vehicles meeting the requirements of this section in a given model year calculated per subsection (a)(3) by 3 for the 2025 model year, 2 for the 2026 model year, and 1 for the 2027 model year and then summing together these yearly results. A manufacturer is not permitted to utilize 2024 and earlier model year vehicles to satisfy the total compliance calculation requirements of the alternative phase-in described in this subsection.

- (5) In lieu of the required phase-ins in subsections (a)(1) and (a)(2) or the alternative phase-ins allowed in subsection (a)(4), small volume manufacturers may meet the respective ZEV and PHEV requirements on all 2028 and subsequent model year vehicles.
- (b) Definitions: For this section, the following definitions apply in addition to the definitions in title 13, California Code of Regulations (CCR), section 1962.4, and associated test procedures:

"Grid energy", for the purposes of tracking grid energy into the battery parameters in subsection (c)(4)(D), means all energy into the battery while connected to grid power (e.g., plugged-in). Grid energy into the battery shall not include electrical losses between the grid and the battery (e.g., from on-board charger inefficiency) or energy directly used by the vehicle without first going into the battery (e.g., electricity utilized directly from before or after the on-board charger to power on-vehicle devices for cabin conditioning, charging control, etc.). For the purposes of tracking the alternating current power into the vehicle or on-board charger from off-board charging parameter in subsection (c)(4)(D), "grid energy" means all energy supplied to the on-board charger.

"Propulsion-related part" means any original equipment system, component, or part that is used on a zero emission vehicle to refuel or recharge the vehicle, store fuel or energy for the vehicle, propel the vehicle, or recover or recoup vehicle kinetic energy, including components used to control, manage, or thermally manage such propulsion components. These include vehicle high voltage batteries, drive motors, inverters, converters, on-board charging system components, fuel cell stack components, refueling and fuel tank components, fuel cell air and fuel delivery components, regenerative braking system components, and the power electronics, electronic control units, and thermal management systems of such components and systems.

"Propulsion system active" is the state where the powertrain (e.g., electric machine) is enabled by the driver (e.g., after the power button is pushed for some vehicles, remote activation to precondition the cabin) such that the vehicle is ready to be used (e.g., vehicle is ready to be driven, ready to be shifted from "park" to "drive", heating, ventilation, and air conditioning (HVAC) turned on to condition cabin prior to driving). For purposes of this definition, "the state where the powertrain is enabled" does not include activations that are not driver-initiated (e.g., conditions where portions of the vehicle system wake up to perform off-board charging).

- (c) Standardization Requirements

Appendix A-6

- (1) Reference Documents: The following SAE International documents are incorporated by reference into this regulation:
 - (A) SAE J1962: SAE J1962 "Diagnostic Connector", July 2016 (SAE J1962).
 - (B) SAE J1979-3, "E/E Diagnostic Test Modes: Zero Emission Vehicle Propulsion Systems on UDS (ZEVonUDS)", published draft March 5, 2022 (SAE J1979-3).
 1. SAE J1979-DA, "Digital Annex of E/E Diagnostic Test Modes", April 2021 (SAE J1979-DA).
 - (C) SAE J2012 "Diagnostic Trouble Code Definitions", December 2016 (SAE J2012).
 1. SAE J2012DA_201812 "Digital Annex of Diagnostic Trouble Code Definitions and Failure Type Byte Definitions", December 2018 (SAE J2012-DA).
 - (D) ZEV 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 Vehicles Classes, adopted XXXXX.
- (2) Diagnostic Connector:
 - (A) A standard data link connector conforming to the "Type A" specifications and in the location specified for "Type A" connectors in SAE J1962 shall be incorporated in each vehicle.
 - (B) The vehicle connector mounting feature shall withstand a force of 220 Newtons applied to the connector mating area in the direction of the connecting and disconnecting process without mechanical and electrical failure. It shall also withstand a force of 220 Newtons applied in all other axial directions without mechanical failure.
 - (C) The connector may not be covered in any way (e.g., may not be covered by a removable panel, dust cap, lid, flap, door).
 - (D) Any pins in the connector that provide electrical power shall be properly fused to protect the integrity and usefulness of the

connector for diagnostic purposes and may not exceed 20.0 Volts DC regardless of the nominal vehicle system or battery voltage.

- (E) Manufacturers may not equip vehicles with additional diagnostic connectors in the driver's side foot-well region of the vehicle interior in the area bound by the driver's side of the vehicle and the driver's side edge of the center console (or the vehicle centerline if the vehicle does not have a center console) if the additional connectors can be mated with SAE J1962 "Type A" external test equipment.
- (3) Communications to a Scan Tool: Manufacturers shall use one of the following standardized protocols for communication to a scan tool of all required messages. Only one protocol per vehicle shall be used to report all required messages.
- (A) SAE J1979-3 "UDSonCAN". The vehicle shall utilize unified diagnostic services (UDS) on a controller area network (CAN) as defined in SAE J1979-3. The vehicle shall respond to functional (i.e., broadcast) and physical (i.e., point-to-point) request messages from a scan tool in accordance with SAE J1979-3 specifications except for Service \$14 (i.e., clear/reset diagnostic information) where the vehicle shall respond to functional and may respond to physical request messages from a scan tool.
 - (B) SAE J1979-3 "UDSonIP". The vehicle shall utilize unified diagnostic services (UDS) on an internet protocol (IP) network as defined in SAE J1979-3.
- (4) Required Functions: The following standardized functions shall be implemented in accordance with the specifications in SAE J1979-3 for the communication protocol used by the vehicle per subsection (c)(3) to allow for access to the required information by a scan tool. These functions and data shall be accessible by a scan tool user and scan tool without the use of any vehicle manufacturer-specific, user-specific, or tool-specific registration, authentication, authorization, login, password, certification, or other mechanism that can be used to restrict or limit user or tool access for any other reason.
- (A) Data Stream: The following signals shall be made available on demand through the standardized data link connector in accordance with SAE J1979-3 and SAE J1979-DA specifications. The actual signal value shall always be used instead of a default or

limp home value that may be substituted in place of the actual signal by the receiving onboard electronic control for use by it or other onboard electronic control units.

1. For all vehicles:
 - a. vehicle speed, absolute accelerator pedal position, time elapsed since start of trip, odometer reading, distance traveled since fault memory last cleared, and number of propulsion system active trips since fault memory last cleared
 - b. high voltage battery pack: state of charge, maximum cell voltage, minimum cell voltage, battery system voltage, cumulative battery system current for the last 1 second, cumulative battery system energy (i.e., power via integrated voltage times current) consumption for the last 1 second
2. Additionally, for all off-board charge capable vehicles:
 - a. High voltage battery pack: state of health, distance traveled since state of health last updated or reset
 - b. actual rate of charge occurring (e.g., kilowatt rate of grid energy into the vehicle from off-board source), maximum rate of charge the vehicle can accept in its current state (e.g., given the condition of the vehicle at the time of charging such as battery temperature and state of charge, the maximum kilowatt rate the vehicle would accept if the off-board source had unlimited power capability)
3. Additionally, for all vehicles equipped with a fuel cell system: cumulative hydrogen fuel consumed by the fuel cell system in the last 1 second, fuel cell system voltage, cumulative fuel cell system generated current for the last 1 second, and cumulative fuel cell system electrical energy (i.e., power via integration of voltage times current) generated from hydrogen for the last 1 second. Fuel cell system current, voltage, and electrical energy shall be measured at the output of any boost convertor or similar power conditioning device that receives electricity from the

fuel cell stack and in turn provides conditioned power to the vehicle motors, battery, or other vehicle loads.

4. Accuracy

- a. For purposes of the data stream parameters, manufacturers shall report the most accurate values that are calculated within electronic control units on the vehicle.
- b. For cumulative battery system current and battery system energy and for cumulative fuel cell system current and fuel cell system electrical energy, manufacturers shall use current and voltage measurements at a sampling rate of no less than 20 hertz to calculate cumulative current and power for the last 1000 milliseconds, and those cumulative values shall be updated at a minimum frequency of 1 hertz.
- c. For the high voltage battery state of health (SOH) parameter, manufacturers shall ensure the reported value is normalized from 0 to 100 percent and correlates to the usable battery energy for the certification range value as measured in accordance with the "California Test Procedures for 2026 and subsequent Model Zero Emission Vehicles and Plug-In Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicles Classes" as applicable. The reported SOH parameter shall correspond to a usable battery energy that is no more than 5 percent higher than the measured usable battery energy.
- d. For vehicles designed to initially hold some battery capacity or energy in reserve and open up access as the vehicle or battery ages (e.g., to widen the minimum and maximum allowed state of charge as the battery degrades to counteract or diminish reduction in battery usable energy), manufacturers shall meet the requirements of subsection (c)(4)(A)4.c., except that the reported battery SOH parameter shall be normalized such that 100 percent

reflects the usable battery energy as if the user was allowed to initially access the maximum the system is designed to ever allow (e.g., a vehicle with a new battery but with the reserve in the system artificially opened up to its maximum range of authority). Upon request by the Executive Officer, the manufacturer shall provide software or other means for CARB to conduct verification testing to ensure the accuracy of the SOH parameter to the measured usable battery energy.

- e. The manufacturer may limit calculation of an updated battery SOH parameter to certain usage conditions of the vehicle (e.g., only when a sequence of sufficient depth of discharge and subsequent charge event occurs) if necessary to maintain the accuracy of the data parameter within the requirements of subsection (c)(4)(A)4.c. above. However, a manufacturer may only use conditions which are technically necessary to ensure robust calculation of the battery SOH parameter, designed to ensure calculation of an updated value will occur under conditions which may reasonably be expected to be encountered in normal urban vehicle operation and use, and designed to ensure calculation of an updated value will occur for vehicles in a test group, on average, at least once every 4,000 miles.

(B) Fault Codes.

1. For all monitored propulsion-related parts and systems, fault codes and fault code status shall be made available through the diagnostic connector in accordance with SAE J1979-3, SAE J2012, and SAE J2012-DA specifications.
2. For all monitored propulsion-related part and system fault codes, the vehicle shall clear diagnostic information and fault codes through a standardized request through the diagnostic connector in accordance with SAE J1979-3 specifications.

(C) Vehicle Identification Information

Appendix A-6

1. Test Group Identification: On all vehicles, the test group designation pursuant to title 13, CCR, section 1962.4(i) used for certification to CARB standards shall be made available through the standardized data link connector in accordance with the SAE J1979-DA specifications. Only one electronic control unit per vehicle shall report the test group.
2. Software Calibration Identification: For each propulsion-related control unit that reports data required by subsections (c)(4)(A), (c)(4)(B), or (c)(4)(D), a software calibration identification number(s) (CAL ID) capable of identifying the version of software being used by the control unit(s) shall be made available through the standardized data link connector in accordance with the SAE J1979-DA specifications. A unique CAL ID shall be used for every propulsion-related calibration or software set having at least one bit of different data from any other propulsion-related calibration or software set.
3. Vehicle Identification Number: All vehicles shall have the vehicle identification number (VIN) available through the standardized data link connector in accordance with SAE J1979-DA specifications. Only one electronic control unit per vehicle shall report the VIN.
4. ECU Name: The name of each propulsion-related electronic control unit that reports data required by subsections (c)(4)(A), (c)(4)(B), (c)(4)(C)1. through (c)(4)(C)3., or (c)(4)(D) shall be communicated in a standardized format in accordance with SAE J1979-DA.

(D) Vehicle Operation Tracking Requirements:

1. Manufacturers shall implement software algorithms to individually track and report the following in a standardized format in accordance with SAE J1979-3 and SAE J1979-DA:
 - a. Total distance traveled
 - b. Total number of propulsion system active trips (where a trip is satisfied whenever the propulsion system active state has been met for at least two seconds plus or minus one second)

Appendix A-6

- c. Total positive kinetic energy
- d. Total electric motor output energy
- e. Total propulsion system active time
- f. Total idle propulsion system active time (where idle is defined as accelerator pedal released by driver and vehicle speed less than or equal to 1.6 kilometers per hour)
- g. Total city propulsion system active time (where city is defined as vehicle speed greater than 1.6 kilometers per hour and less than or equal to 60 kilometers per hour)
- h. Total fuel cell system active time (if equipped with a fuel cell system), defined as the total time in which the fuel cell stack consumes hydrogen and generates electricity in any mode of operation
- i. Total fuel cell system energy generated (if equipped with a fuel cell system)
- j. Total hydrogen fuel consumed (if equipped with a fuel cell system)
- k. Total net battery current in the state of propulsion system active
- l. Total net energy consumed in the state of propulsion system active
- m. Total energy into battery (e.g., from regenerative braking) during the state of propulsion system active
- n. Total grid energy into the battery during off-board charging
- o. Total grid energy into the battery from off-board direct current (DC) charging
- p. If equipped with the capability to determine alternating current (AC) power into the vehicle or on-

board charger during off-board charging, total grid energy into the vehicle from off-board AC charging

- q. Total battery energy supplied to an off-board usage (e.g., grid, power port) during propulsion system non-active operation (e.g., vehicle to home)
 - r. Average battery temperature during charging and propulsion system active, weighted by battery energy throughput
- 2. Numerical Value Specifications: For each data parameter specified in subsection (c)(4)(D)1., the value shall be stored twice, one representing the lifetime of the vehicle and the second representing recent operation in accordance with SAE J1979-DA specifications. If any of the individual lifetime values reach the maximum value defined in SAE J1979-DA, all lifetime values shall be divided by two before any are incremented again to avoid software overflow problems.
 - 3. For data parameters specified in subsection (c)(4)(D), CARB, or a third party contracted directly by CARB, may not collect data from vehicles owned by a private individual unless the data is:
 - a. Obtained with the voluntary and informed consent of the vehicle operator; and
 - b. Collected and stored in a manner in accordance with required data security and record keeping policies applicable to CARB to protect the data from unauthorized access or being used to identify the individual vehicle (i.e., vehicle identification number or license plate number) or registered owner.
- (5) Data Reporting Requirements for Over-the-Air Reprogramming
- (A) For all vehicles,(c)(4)(D) the manufacturer shall collect all lifetime values stored in the vehicle pursuant to subsection (c)(4)(D) prior to over-the-air reprogramming of any control module, if any such data would be erased by such reprogramming.

- (B) For any data collected pursuant to subsection (c)(5)(A), the manufacturer shall submit a report to the Executive Officer containing the average value and standard deviation of each collected data parameter for each affected certified test group as specified in "Data Record Reporting Procedures for Over-the-Air Reprogrammed Vehicles and Engines Using SAE J1979-2", dated December 15, 2021, and incorporated by reference. The manufacturer shall submit a separate report for each unique calibration/software update. The manufacturer shall submit the report within 75 calendar days of the availability of the calibration/software update to affected vehicles.

- (6) Display of Data to the Vehicle User
 - (A) Each vehicle shall also be able to display the battery SOH parameters in subsection (c)(4)(A)2.a. above, (c)(4) in vehicle, to the vehicle user without the use of any tools.

 - (B) Each vehicle shall also be able to display the charge rate parameters in subsection (c)(4)(A)2.b.(c)(4) above, in vehicle, to the vehicle user during charging without the use of any tools.

 - (C) The display in vehicle of the parameters identified in this subsection (c)(6) shall be:
 - 1. readable by the user with no more than 5 selectable screens or submenu selections needed to access the parameter from the home or default display/screen;
 - 2. in alphanumeric format;
 - 3. displayed with the same resolution as the standardized data parameter; and
 - 4. converted to standard engineering units, as applicable (e.g., percent, miles, kilowatts).

- (d) Certification Documentation. The manufacturer shall submit documentation related to the requirements of this section in the manufacturer's certification application in accordance with title 13, CCR, section 1962.4(i).

- (e) Production Vehicle Verification of Standardized Requirements.

- (1) After being certified pursuant to CCR, title 13, section 1962.4, manufacturers shall perform testing to verify that all vehicles meet the requirements of subsections (c)(3) and (c)(4).
- (2) Selection of Test Vehicles: Manufacturers shall perform this testing every model year on one production vehicle for every unique calibration no later than 60 days after the start of normal production for that calibration. Manufacturers may request, with supporting documentation, Executive Officer approval to group multiple calibrations together and test one representative calibration per group. The Executive Officer shall approve the request upon finding that the software designed to comply with the standardization requirements of subsection (c) in the representative calibration vehicle is identical (e.g., communication protocol message timing, number of supported data stream parameters) to all others in the group and that any differences in the calibrations are not material with respect to meeting the criteria in subsection (e)(3). The Executive Officer shall notify a manufacturer in writing of the approval or denial of such request within 30 days of receiving the request.
- (3) Test Equipment: For the testing required in subsection (e), manufacturers shall utilize an off-board device to conduct the testing. At least 30 days prior to conducting testing, manufacturers are required to request Executive Officer approval of the off-board device that the manufacturer will use to perform the testing. As part of their requests, manufacturers shall include data, specifications, or engineering analysis that demonstrate that the off-board device will verify vehicles' ability to perform all of the required functions in subsection (e)(4) for the specific vehicle in accordance with SAE J1979-3 specifications. The Executive Officer shall approve the request upon determining that the manufacturer has submitted such data, specifications, or engineering analysis. The Executive Officer shall notify a manufacturer in writing of the approval or denial of such request within 30 days of receiving the request.
- (4) Required Testing:
 - (A) The testing shall verify that the vehicle can properly establish communications between all propulsion-related onboard computers and any scan tool designed to meet the communication protocols allowed in subsection (c)(3);

Appendix A-6

- (B) The testing shall further verify that the vehicle can properly communicate the following information in accordance with SAE J1979-3 and SAE J1979-DA specifications:
1. All data stream parameters required in subsection (c)(4)(A) including the identification of each data stream parameter as supported;
 2. The vehicle identification information in subsection (c)(4)(B)2;
 3. All vehicle operation tracking data parameters required in subsection (c)(4)(D); and
 4. Any fault code (including failure type byte and status byte) required in subsection (c)(4)(B)1. for a propulsion-related electronic powertrain control unit designed to report such fault codes.
- (C) The testing shall also verify that the vehicle can properly respond to a request to clear propulsion-related fault codes as required in subsection (c)(4)(B)2.
- (D) Reporting of Results:
1. The manufacturer shall notify the Executive Officer within 30 days of identifying any vehicle that does not meet any of the requirements of subsection (e)(3). The manufacturer shall submit a written report describing the problem(s) identified to the Executive Officer. The written report shall include proposed corrective action to remedy the problem(s), including an implementation timeframe, for the Executive Officer's approval. Factors to be considered by the Executive Officer in approving the proposed corrective action shall include the severity of the problem(s), the ability of service technicians to access the required information, the ability of CARB to access the information needed to conduct vehicle testing, the impact on equipment and tool manufacturers, and the amount of time prior to implementation of the proposed corrective action.
 2. For any vehicle that meets all the requirements of subsection (e)(4), the manufacturer shall submit a report of

the test results and the test log file to the Executive Officer within 90 days of that vehicle's testing.

- (f) Electronic submittal. Unless otherwise specified, reports, documentation, and requests under this Section must be provided to the California Air Resources Board through the electronic Document Management System available through the website: <https://arb.ca.gov/certification-document-management-system>.
- (g) Deficient Requirements. For 2026 through 2029 model year vehicles, the Executive Officer, upon receipt of a certification application from the manufacturer, may certify vehicles even though said vehicles may not comply with one or more of the requirements of subsections (c)(4)(A)1., (c)(4)(A)3., (c)(4)(C), or (c)(4)(D)1. The Executive Officer shall grant certification for 2026 and 2027 model year vehicles that meet at least 50 percent, 2028 model year vehicles that meet at least 70 percent, and 2029 model year vehicles that meet at least 90 percent of the total number of applicable individual requirements within subsections (c)(4)(A)1., (c)(4)(A)3., (c)(4)(C), and (c)(4)(D)1. For purposes of this calculation, each separately numbered subsection shall count as an individual requirement (e.g., (c)(4)(A)1.b., (c)(4)(D)1.g.) if it is applicable to the vehicle (e.g., (c)(4)(D)1.h. only counts as an individual requirement for fuel cell electric vehicles). The deficient requirements do not need to be included in any written report pursuant to subsection (e)(4)(D)1., provided the manufacturer provided a list of deficient requirements as part of its certification application per CCR, title 13, section 1962.4(i)(e)(L).
- (h) Enforcement. Compliance testing, determination of noncompliance, and subsequent need for corrective actions shall be done in accordance with title 13, CCR, section 1962.7.
- (i) Severability. Each provision of this section is severable, and in the event that any provision of this section is held to be invalid, the remainder of this section and this article remains in full force and effect.

Note: Authority cited: Sections 38510, 38560, 39039, 39600, 39601, 39602.5, 43006, 43013, 43016, 43018, 43100, 43101, 43104, 43105.5, 43106, and 44036.2, Health and Safety Code; and *Engine Manufacturers Association v. State Air Resources Board* (2014) 231 Cal.App.4th 1022. Reference: Sections 38501, 38510, 38560, 43006, 43013, 43018, 43100, 43101, 43102, 43104, and 43106, Health and Safety Code.