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

(a) Applicability. These procedures shall apply to California certified 2026 and subsequent model year zero-emission light-duty vehicles sold in California pursuant to Health and Safety Code section 43102.

(b) Definitions: The following definitions are applicable to this section:

"Grid energy", for the purposes of tracking grid energy parameters in subsection (c)(4)(D), means all energy into the battery while connected to grid power (e.g., plugged-in). Grid energy 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.).

(c) Standardization Requirements

(1) Reference Documents: The following SAE International and International Organization for Standardization (ISO) documents are incorporated by reference into this regulation:

(A) SAE J1962: SAE J1962 "Diagnostic Connector", September 2015 (SAE J1962).

(B) SAE J1978 "OBD II Scan Tool - Equivalent to ISO/DIS 15031-4:December 14, 2001", April 2002 (SAE J1978).

(C) SAE J1979 "E/E Diagnostic Test Modes", August 2014 (SAE J1979).

  (i) SAE J1979-DA, "Digital Annex of E/E Diagnostic Test Modes", April 2021.

  (ii) SAE J1979-2, "E/E Diagnostic Test Modes: OBDonUDS", April 2021 (SAE J1979-2)

  (iii) [*TBD e.g., J1979-3? NOTE: CARB is aware of and tracking work by industry to develop a ZEV specific version of J1979 and/or to include a second protocol option such as Internet Protocol (Ethernet) and is still evaluating whether such options will be developed in time or included as possible options.*]

(D) SAE J2012 "Diagnostic Trouble Code Definitions", March 2013 (SAE J2012).

  (i) SAE J2012-DA "Digital Annex of Diagnostic Trouble Code Definitions and Failure Type Byte Definitions", January 2013.

(E) ISO 15765-4:2011 "Road Vehicles-Diagnostic communication over Controller Area Network (DoCAN) - Part 4: Requirements for emissions-related systems", February 2011 (ISO 15765-4).

  (i) ISO 15765-4: "Road vehicles - Diagnostic communication over Controller Area Network (DoCAN) - Part 4: Requirements for emissions-related systems - Amendment 1," February 2013 (ISO 15765-4)

(F) SAE J1699-3 - "Vehicle OBD II Compliance Test Cases", July 2015 (SAE J1699-3)

(G) SAE J2534-1 - "Recommended Practice for Pass-Thru Vehicle Programming", December 2004 (SAE J2534-1).

(H) ZEV Test Procedures – "Add our ZEV test procedures"

(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 the following standardized protocol for communication of all required messages from on-board to off-board network communications to a scan tool meeting SAE J1978 specifications:

(A) ISO 15765-4. All required messages using this protocol shall use a 500 kbps baud rate. 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 J1979-2 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) [*TBD*]

(4) Required Functions: The following standardized functions shall be implemented in accordance with the specifications in SAE J1979-2 to allow for access to the required information by a scan tool meeting SAE J1978 specifications:

(A) Data Stream: The following signals shall be made available on demand through the standardized data link connector in accordance with SAE J1979-2 specifications. The actual signal value shall always be used instead of a default or limp home value.

(i) 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, state of health, distance since state of health last updated or reset, 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 voltage times current) consumption for the last 1 second

    c. actual rate of charge occurring (i.e., kilowatt rate of grid energy into vehicle from off-board source), maximum rate of charge vehicle can accept in its current state (e.g., given the current state of the vehicle, battery, ambient temperature, etc.)

(ii) 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, 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 the reported values shall be updated at a minimum frequency of 1 hertz.

    c. For state of health (SOH), manufacturers shall ensure the high voltage battery pack state of health parameter, normalized from 0 to 100 percent, shall, except as noted in subsection (c)(4)(A)(ii)d. below, correlate to the usable battery energy for the certified all-electric range 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 accuracy of the reported SOH parameter shall be such that it reports a value that corresponds 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 high voltage battery capacity or energy in reserve and open up access as the vehicle or battery ages (e.g., to widen the minimum and maximum state of charge as the battery degrades to counteract or diminish reduction in

battery usable energy), the high voltage battery state of health metric shall be normalized such that 100 percent reflects the usable battery energy 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 system artificially opened up to its maximum range of authority). Upon request by the Executive Officer, the manufacturer of such designed systems shall work with CARB to provide a means of allowing CARB to conduct verification testing to ensure the accuracy of the state of health parameter to the measured usable battery energy.

(B) Fault Codes. For all monitored propulsion-related components and systems, fault codes and fault code status shall be made available through the diagnostic connector in accordance with SAE J1979-2 and J2012 specifications.

(C) Vehicle Identification Information

   (i) Test Group Identification: On all vehicles, the test group designation used for certification to CARB standards and consisting of 12 printable ASCII characters shall be made available through the standardized data link connector in accordance with the SAE J1979-2 specifications. Only one electronic control unit per vehicle shall report the Test Group to an SAE J1978 scan tool

   (ii) Software Calibration Identification: On all vehicles, a software calibration identification number(s) (CAL ID) for the propulsion-related control unit(s) 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 J1979-2 specifications.

   (iii) Vehicle Identification Number: All vehicles shall have the vehicle identification number (VIN) available in a standardized format through the standardized data link connector in accordance with SAE J1979-2 specifications. Only one electronic control unit per vehicle shall report the VIN to an SAE J1978 scan tool.

   (iv) ECU Name: The name of each propulsion-related electronic control unit that responds to an SAE J1978 scan tool with a unique address or identifier shall be communicated in a standardized format in accordance with SAE J1979-2 (i.e., ECUNAME in Service $22, InfoType $F80A).

(D) Vehicle Operation Tracking Requirements:

   (i) manufacturers shall implement software algorithms to individually track and report in a standardized format the following to a scan tool meeting SAE J1978 specifications:

      a. Total distance traveled
      b. Total number of propulsion system active trips (where a trip is satisfied whenever propulsion system active status has nominally been met for at least two seconds plus or minus one second)
      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 kilometer per hour).

g. Total city propulsion system active time (where city is defined as vehicle speed greater than 1.6 kilometer per hour and less than or equal to 60 kilometers per hour).

h. Total fuel consumed (for FCEVs)

i. Total net battery current in propulsion system active operation

j. Total net energy consumed in propulsion system active operation

k. Total energy into battery (e.g., from regenerative braking) during propulsion system active operation [*NOTE: Net energy + energy into battery = throughput energy. Need 2 of the 3 tracked*]

l. Total grid energy into the battery during off-board charging

m. Total grid energy into the battery from off-board direct current (DC) charging.

n. 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.

o. 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).

p. Average battery temperature during charging and propulsion system active, weighted by battery energy throughput [*TBD on details, intended to help discern 'atypical' vehicles to exclude from CARB compliance testing for durability standard*]

(ii) Numerical Value Specifications: For each counter specified in subsection (c)(4)(D):

a. Each number shall conform to the standardized format specified in SAE J1979-2.

b. Each number shall be stored twice, one representing the lifetime of the vehicle and the second representing recent operation.

1. For the lifetime counters, each number shall be reset to zero only when a non-volatile memory reset occurs (e.g., reprogramming event). Numbers may not be reset to zero under any other circumstances including when a scan tool (generic or enhanced) command to clear fault codes or reset KAM is received.

2. For the recent operation counters, each number shall be reset to zero when the recent operation counter for cumulative propulsion system active time reaches 50 hours or a scan tool command to clear fault codes is received.

c. If any of the individual lifetime counters reach the maximum value, all lifetime counters shall be divided by two before any are incremented again to avoid overflow problems.

d. The counters shall be made available to a generic scan tool in accordance with the SAE J1979-2 specifications and may be rescaled when displayed, if required by the SAE specifications (e.g., seconds to hours, minutes, and seconds).

(iii) For data parameters specified in subsection (c)(4)(D), all data directly collected from vehicles owned by a private individual by either ARB or by a third party contracted directly by CARB shall be:

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 ARB to protect the data from: (a) unauthorized access; or (b) 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, if any of the data required to be stored and made available pursuant to subsection (c)(4)(D) would be erased by an over-the-air reprogramming of any control module, the manufacturer shall collect all lifetime data stored in the vehicle pursuant to these sections using the over-air-network prior to their erasure.

(B) The manufacturer shall submit a report to the Executive Officer containing the average value and standard deviation of each collected parameter for each affected certified test group as specified in, "Data Record Reporting Procedures for Over-the-Air Reprogrammed Vehicles and Engines", dated August 16, 2018, and incorporated by reference in title 13, CCR section 1968.2. The manufacturer shall submit the report within 75 calendar days of the availability of the calibration/software update to affected vehicles. The manufacturer shall submit a separate report for each unique calibration/software update.

(6) Display of Data to the Vehicle User

(A) For the high voltage battery pack state of health and distance since state of health last updated or reset parameters, in addition to making the data available to a scan tool in accordance with subsection (c)(4) above, the parameters shall be able to be displayed in vehicle to the vehicle user without the use of any tools.

(B) For the actual rate of charge occurring and the maximum rate of charge vehicle can accept in its current state parameters, in addition to making the data available to a scan tool in accordance with subsection (c)(4) above, the

normalized parameter shall be able to be displayed in vehicle to the vehicle user during charging without the use of any tools.

(C) For display in vehicle of the parameters identified in this subsection (c)(6), the parameters shall be:

   (i) 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;

   (ii) in alphanumeric format;

   (iii) readable with the same resolution as the standardized data parameter; and

   (iv) converted to standard engineering units, as applicable (e.g., percent, miles, kilowatts).

(d) Certification Documentation

   (1) When submitting an application for certification of a test group, the manufacturer shall submit the following documentation. If any of the items listed below are standardized for all of a manufacturer's test groups, the manufacturer may, for each model year, submit one set of documents covering the standardized items for all of its test groups. With Executive Officer approval, one or more of the documentation requirements of section (i) may be waived or modified if the manufacturer demonstrates that the information required would be redundant or unnecessarily burdensome to generate.

   (2) The following information shall be submitted with the certification application. The information must include:

      (A) A written identification of the communication protocol utilized by each test group for communication with an SAE J1978 scan tool.

      (B) A pictorial representation or written description (including any covers or labels) of the diagnostic connector and its location representative of every model covered by the application. The manufacturer may submit one set of information for a group of models whose diagnostic connectors have the same design, orientation, and location.

      (C) A statement of compliance indicating that the test groups in the application comply with the requirements of section 1962.5 and indicating that the manufacturer will comply with the required deadlines for submission of results/data for production vehicle evaluation testing under subsection (e).

      (D) Any other information determined by the Executive Officer to be necessary to demonstrate compliance with the requirements of this regulation.

(e) Production Vehicle Verification of Standardized Requirements.

   (1) Requirement: Manufacturers shall perform testing to verify that all vehicles meet the requirements of subsections (c)(3) and (c)(4) relevant to proper communication of required messages to an SAE J1978 scan tool.

(2) Selection of Test Vehicles: Manufacturers shall perform this testing every model year on one production vehicle from every unique calibration no later than two months after the start of normal production for that calibration. Manufacturers may request 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, etc.) to all others in the group and that any differences in the calibrations are not relevant with respect to meeting the criteria in subsection (e)(4).

(3) Test Equipment: For the testing required in subsection (e), manufacturers shall utilize an off-board device to conduct the testing. Prior to conducting testing, manufacturers are required to request and receive Executive Officer approval of the off-board device that the manufacturer will use to perform the testing. For vehicles utilizing J1979-2, the Executive Officer shall approve the request upon determining that the manufacturer has submitted data, specifications, and/or engineering analysis that demonstrate that the off-board device meets the minimum requirements to conduct testing according to SAE J1699-3 using the software developed and maintained for the SAE J1699-3 committee and available through www.sourceforge.net and SAE J2534 compliant hardware configured specifically for SAE J1699-3 testing.

(4) Required Testing (i.e., "static" testing portion of SAE J1699-3):

(A) The testing shall verify that the vehicle can properly establish communications between all propulsion-related onboard computers and any SAE J1978 scan tool designed to adhere strictly to the communication protocols allowed in section (c)(3);

(B) The testing shall further verify that the vehicle can properly communicate to any SAE J1978 scan tool:

(i) All data stream parameters required in section (c)(4)(A) including the identification of each data stream parameter as supported;
(ii) The CAL ID, Test Group, VIN, and ECU Name in accordance with SAE J1979-2 and subsection (c)(4)(C);
(iii) All vehicle operation tracking data parameters required in section (c)(4)(D); and
(iv) Any fault code (including failure type byte and status byte) in accordance with SAE J1979-2 and section (c)(4)(B) for each propulsion-related electronic powertrain control unit.

(C) The testing shall also verify that the vehicle can properly respond to any SAE J1978 scan tool request to clear propulsion-related fault codes.

(5) Reporting of Results:

(A) The manufacturer shall notify the Executive Officer within one month of identifying any vehicle that does not meet the requirements of section (e)(4).

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The manufacturer shall submit a written report of the problem(s) identified and propose corrective action (if any) to remedy the problem(s) to the Executive Officer for 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.

   (B) Within three months of any passing testing conducted pursuant to section (e), a manufacturer shall submit a report of the results and the test log file to the Executive Officer for review.

(f) Enforcement. Compliance testing, determination of noncompliance, and subsequent need for corrective actions shall be done in accordance with title 13 CCR section 1962.7.

Note: Authority cited: Sections 38510, 39039, 39600, 39601, 39602.5, 430046, 43013, 43016, 43018, 43100, 43101, 43104, 43105, 43105.5, 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, 39002, 39003, 39018, 39039, 43000, 43000.5, 43006, 43013, 43016, 43018, 43100, 43101, 43102, 43104, 43105, 43106, 43150, 43151, 43152, and 43153, Health and Safety Code.