

Please Note: This is a discussion draft that is still subject to change.

PROPOSED REGULATION ORDER

SECTION 1. Heavy-Duty Advanced-Technology Vehicle Certification Requirements

- (a) Applicability. Except as provided, all vehicles and equipment listed in this subdivision must certify in accordance with this article.
- (1) Model Year (MY) 2023 and subsequent battery-electric vehicles over 8,500 pounds gross vehicle weight rating (GVWR) that are not certifying in accordance with [the LD ZEV Procedures];
 - (2) MY 2023 and subsequent fuel cell electric vehicles over 8,500 pounds GVWR that are not certifying in accordance with [the LD ZEV Procedures];
 - (3) MY 2020 through MY 2022 battery-electric or fuel-cell electric vehicles over 8,500 GVWR for which the manufacturer optionally elects to certify in accordance with this article;
 - (4) Battery-electric and fuel-cell electric powertrain conversions; and
 - (5) Battery-electric or fuel-cell electric off-road equipment for which the manufacturer optionally elects to certify in accordance with this article.

(b) Definitions: For the purpose of this article, the following definitions apply:

“Applicant” or “manufacturer” means the person who applies for a certification or approval letter pursuant to this article.

“Base vehicle” means the California-certified configuration of a pre-converted, non-zero emission vehicle.

“Battery-Electric Vehicle” means

“Battery End of Life” means...

“Battery Module” means...

“Battery Rated Ampere-Hour Capacity” means the manufacturer-rated capacity of a battery in Ampere-hour obtained from a battery discharged at the manufacturer’s recommended discharge rate (C/1-C/6) such that a specified minimum cut-off terminal voltage is reached.

“Battery Pack” means...

“Conversion” means...

“Drivetrain” means... and includes, but is not limited to, axels, gearboxes,...

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“Energy Storage System” means

“Executive Officer” means the Executive Officer of the California Air Resources Board or his or her authorized representative.

“Fuel-Cell Electric Vehicle” means

“Gross Vehicle Weight Rating” or “GVWR” has the same definition as that in California Vehicle Code Section 350, subdivision (a).

“Intermediate Volume Manufacturer” means a manufacturer with 1) a sales volume of at least 51 in one or more of the three model years immediately prior to the model year for which the certification is being sought, but no more than 250 in any one of those three model years, **or** 2) in cases where the manufacturer did not sell an engine, vehicle, or powertrain during the three model years immediately prior to the model year for which the certification is being sought, a projected sales volume of at least 51, but no more than 250, for the model year for which the certification is being sought.

“Large Volume Manufacturer” means a manufacturer with 1) a sales volume of greater than 250 in any one of the three model years immediately prior to the model year for which the certification is being sought, **or** 2) in cases where the manufacturer did not sell an engine, vehicle, or powertrain during the three model years immediately prior to the model year for which the certification is being sought, a projected sales volume of at least 251 for the model year for which the certification is being sought.

“Model year” or “MY” means the manufacturers’ annual new model production period, except as restricted under this definition. It must include January 1 of the calendar year for which the mode year is named, may not begin before January 2 of the previous calendar year, and must end by December 31 of the calendar year for which the mode year is named. Manufacturers may not adjust model years to circumvent or delay compliance to avoid the obligation to certify annually.

“Net Energy Change” means the net change in energy level of a rechargeable energy storage system expressed in Joules (watt-seconds).

“Sales Volume” means the total number of engines, vehicles, and powertrains (including energy storage systems sold without drivetrain components) sold in the United States by a manufacturer.

“Small Volume Manufacturer” means a manufacturer with 1) a sales volume of less than 51 in each of the three model years immediately prior to the model year for which the certification is being sought, **and** a projected sales volume of less than 51 for the model year for which the certification is being sought.

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“Powertrain” means the energy storage system and the drivetrain.

“Total Usable Capacity” means

“Total Usable Energy” means

“Transit bus” means a passenger-carrying vehicle owned or operated by a public transit agency that is 35 feet or longer and greater than 33,000 pounds GVWR.

“Warranty condition” means.....

“Warranty period means the period of time or mileage (miles, hours, kw-hr) that the vehicle or part are covered by the warranty provisions.

“Warranted part” means.....

“Warranty station” means a service facility authorized by the vehicle, powertrain, or energy storage system manufacturer to perform warranty repairs. This shall include all of the manufacturer’s dealerships that are franchised to service the subject vehicles, power trains, or energy storage systems.

(c) Vehicle/Equipment Certification Levels. Applicable vehicles and equipment must be certified to the levels set forth in this subdivision.

(1) Battery-Electric Vehicles

- a. Small volume manufacturers must certify applicable battery-electric vehicles to, at a minimum, Level 1 certification requirements. A small volume manufacturer may also elect to certify such vehicles to Level 2 or 3 certification requirements to satisfy requirements set forth in other regulations, funding programs, or other provisions of law.
- b. Intermediate volume manufacturers must certify applicable battery-electric vehicles to, at a minimum, Level 2 certification requirements. An intermediate volume manufacturer may also elect to certify such vehicles to Level 3 certification requirements to satisfy requirements set forth in other regulations, funding programs, or other provisions of law.
- c. Large volume manufacturers of battery-electric vehicles must certify applicable battery-electric vehicles to Level 3 certification requirements.

(2) A manufacturer must certify applicable fuel-cell electric vehicles to, at a minimum, Level 1 certification requirements. Such manufacturer may also elect to certify such vehicles to Level 2 or 3 certification requirements to satisfy requirements set forth in other regulations, funding programs, or other provisions of law.

(3) Battery-Electric and Fuel-Cell Electric Conversions [Placeholder for Future Content]

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- (4) A manufacturer may certify applicable zero-emission off-road equipment to any certification level set forth in this article to satisfy requirements set forth in other regulations, funding programs, or other provisions of law.

(d) General Warranty Requirements

- (1) The warranty period shall begin on the date the vehicle is delivered to an ultimate purchaser, or if the vehicle is first placed in service as a “demonstrator” or “company” car prior to delivery, on the date it is first placed in service.
- (2) The warranty coverage provided must warrant the vehicle to be free from defects in materials and workmanship.
- (3) Replacement parts must be identical in all material respects to the part as described in the vehicle manufacturer’s application for certification.
- (4) Any warranted part that is not scheduled for replacement as required maintenance in the written instructions required by section XX shall be warranted for the applicable warranty period defined by section XX. If any such part fails during the period of warranty coverage, it shall be repaired or replaced by the vehicle manufacturer according to section XX. Any such part repaired or replaced under the warranty shall be warranted for the remaining warranty period.
- (5) Any warranted part that is scheduled only for regular inspection in the written instructions required by section XX shall be warranted for the applicable warranty period defined in section XX. A statement in such written instructions to the effect of “repair or replace as necessary” shall not reduce the period of warranty coverage. Any such part required or replaced under warranty shall be warranted for the remaining warranty period.
- (6) Any warranted part that is scheduled for replacement as required maintenance in the written instructions required by section XX shall be warranted for the period of time, mileage, and/or energy throughput, whichever first occurs, prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part shall be repaired or replaced by the vehicle manufacturer according to section XX. Any such part required or replaced under warranty shall be warranted for the remainder of the period prior to the first scheduled replacement point for the part.
- (7) Repair or replacement of any warranted part under the warranty provisions of this article shall be performed at no charge to the vehicle owner at a warranty station, except in the case of an emergency when a warranted part or a warranty station is not reasonably available to the vehicle owner. In an emergency, repairs may be performed at any available service establishment, or by the owner, using any replacement part. The manufacturer shall reimburse the owner for his or her expenses including diagnostic charges for emergency repair or replacement, not to exceed the manufacturer’s suggested retail price for all warranted parts replaced and labor charges

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based on the manufacturer's recommended time allowance for the warranted repair and the geographically appropriate hourly labor rate. A vehicle owner may reasonably be required to keep receipts all failed parts in order to receive compensation for warranted repairs reimbursable due to the emergency, provided the manufacturer's written instructions required by section XX advise the owner of this obligation.

- (8) Notwithstanding the provisions of subsection XX, warranty services or repairs shall be provided at all of a manufacturer's dealerships which are franchised to service the subject vehicles, power plants, or energy storage systems.
- (9) The vehicle owner shall not be charged for diagnostic labor which leads to the determination that a warranted part is defective, provided that such diagnostic work is performed at a warranty station.
- (10) The vehicle, power plant, or energy storage system manufacturer shall be liable for damages to other vehicle components proximately caused by a failure under warranty of any warranted part.
- (11) Throughout the vehicle, power plant, or energy storage system warranty period defined in section XX, the vehicle, power plant, and energy storage system manufacturer shall maintain a supply of warranted parts sufficient to meet the expected demand for such parts. The lack of availability of such parts or the incompleteness of repairs within a reasonable time period, not to exceed 30 days from the time of vehicle, power plant, or energy storage system is initially presented to the warranty station for repair, shall constitute an emergency for purposes of section XX.
- (12) Any replacement parts may be used in the performance of any maintenance or repairs. Any replacement part designated by a manufacturer may be used in warranty repairs provided without charge to the vehicle owner. Such use shall not reduce the warranty obligations of the vehicle, power plant, or energy storage system, except that the vehicle, power plant, or energy storage system shall not be liable under this article for repair or replacement of any replacement part which is not a warranted part (except as provided in (l) above).
- (13) The Executive Officer may request and, in such case, the vehicle, power plant, or energy storage system manufacturer shall provide, any documents which describe the manufacturer's warranty procedures or policies.
- (14) Each manufacturer shall furnish with each new vehicle, power plant, or energy storage system, written instructions for the maintenance and use of the vehicle, power plant, or energy storage system and the use by the owner and the instructions shall be consistent with this article and applicable regulations in article x of this chapter.
- (15) Starting in 2023 model year, each manufacture shall submit the documents required by section XX with the manufacturer's preliminary application for new vehicle (powertrain and energy storage system) certification for approval by the Executive Officer. The Executive Officer shall approve or disapprove the documents required by sections XX within 90 days of the date the completed application is received from the manufacturer. Any disapproval shall be accompanied by a statement of the reasons thereof. In the event of

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disapproval, the manufacturer may petition the Board to review the decision of the Executive Officer.

- (16) Exclusions
- (17) The repair or replacement of any warranted part otherwise eligible for warranty coverage under sections XX shall be excluded from such warranty coverage if the vehicle, drivetrain, or energy storage system demonstrates that the vehicle, drivetrain, or energy storage system has been abused, neglected, or improperly maintained, and that such abuse, neglect, or improper maintenance was the direct cause of the need for repair or replacement of the part. (4) Reporting warranty repairs
- (18) Disclosure Requirements

(e) Fuel-Fired Heater:

- (1) Complies with LEV II ULEV standard.
- (2) Cannot be designed to turn on above 40 degrees F.
- (3) No Evaporative Emissions.

(f) Operator's Manual

- (1) Clear Warranty Language Provisions. For warranty provided for vehicles certified pursuant to this article, a manufacturer shall clearly indicate the warranty coverage period for full replacement along with any prorated coverage periods. [Placeholder for Future Content]
- (2) Vehicle Repair and Service Network
 - a. A manufacturer shall make available to the purchaser a current list of repair and service locations capable of servicing, diagnosing, and repairing vehicles equipped with the zero-emission powertrain described in this application. A manufacturer must indicate the method by which they are making this information available to the purchaser at the time of sale and available to the operator/owner at least through the warranty period for the vehicle. A manufacturer may choose from one or more of the following options and describe in their application:
 - 1. Provide a physical copy in the owners/operators manual, or loose paper insert in the glove box of the: street address, phone number, website, and email address of service and repair locations within at least the geographic borders of the state of California.
 - 2. Digital access to a current list of repair and service centers through on-board vehicle integrated telemetry, mobile electronic applications, manufacturer's website, and other...
 - 3. If mobile service is provided in addition to or in lieu of a physical service location, a manufacturer shall provide a description of the services that can be performed in the field along with response times, etc

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4. If a manufacturer provides/offers remote/wireless diagnostic and repair services, the applicability and limitations of this service type shall be clearly described...examples to include...GPS/Satellite/Cellular signal, digital faults/errors, etc...

(3) Warranty Reporting

(4) A manufacturer shall include any and all required maintenance procedures and maintenance intervals as appropriate for the electric powertrain, energy storage system, thermal controls, etc...

(g) Powertrain Labeling

(1) Required HD Phase 1 or 2 Information

(2) "Conforms with the California's certification requirements for heavy duty advanced technology vehicles."

(3) Fuel-fired heater information, if applicable

(4) Total Usable Capacity, in amp-hour

(5) Total Usable Energy, in kilowatt

(6) Cycles to End of Life

(7) Description of Battery Chemistry/Architecture

(8) If the applicant has not included a fuel fired heater in their application, the vehicle must include a statement that "no fuel fired heaters may be installed".

(h) Severability

If any subsections, subdivision, paragraph, subparagraph, sentence, clause, phrase, or portion of this article is, for any reason, held invalid, unconstitutional, or unenforceable by any court of component jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions of the regulation.

SECTION 2. Certification Requirements for New Battery-Electric and Fuel-Cell Electric Vehicles

- (a) **Certification Families:** Each battery chemistry and architecture combination (based on cell chemistry, cell construction, thermal management system, battery management system, and rated capacity at the battery pack level for the energy storage system) constitutes a certification family and each family is required to obtain its own Executive Order. The Executive Order shall cover all vehicles in which the battery chemistry/architecture combination is installed.
- (b) **Level 1 Requirements**
- (1) **Application Package:** For each unique battery chemistry and architecture combination, a vehicle manufacturer certifying at Level 1 is required, at a minimum, to submit to the Executive Officer an application package, which includes the following:
- a. **Letter of Intent:** A manufacturer must include in its application package a letter requesting vehicle certification.
 - b. **Vehicle Model List.** Provide the list of vehicle models in which the powertrain will be installed. For each vehicle model, provide the following:
 - 1. Vehicle model number
 - 2. Intended application (e.g., vocational vehicle, transit bus, refuse truck)
 - 3. GVWR
 - c. **Drivetrain Specifications**
 - 1. A manufacturer shall provide specifications for the gear box(s), transmission(s), and transaxle(s), as appropriate.
 - 2. A manufacturer shall indicate the type, number, mounting location, along with the peak and continuous power ratings in units of kilowatts of the electric motor(s) that will provide tractive effort.
 - 3. Description of inverter(s)...
 - 4. Description of motor controller(s)
 - 5. Other...
 - d. **Energy Storage System**
 - 1. **Description:** A manufacturer shall provide the following information:
 - (A) Cell type (wet, dry, molten, solid state, other)
 - (B) Cell construction (prismatic, cylindrical, other)
 - (C) Anode material/chemistry
 - (D) Cathode material/chemistry
 - (E) Electrolyte phase and composition/chemistry
 - (F) Thermal control strategy (heating and cooling)

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2. Capacity Offerings: A manufacturer shall report the usable battery capacity and usable battery energy at the pack level. A manufacturer must indicate the method by which the usable battery capacity and usable battery energy were derived. Capacity must be reported in units of amp-hours. Energy must be reported in units of kilowatt-hours.
 - e. Fuel-Cell System, if applicable [Placeholder for Future Content]
 - f. Sales Volume Reporting
 1. Projected Sales. For the model year for which the certification is sought, a manufacturer shall report:
 - (A) Projected total vehicle sales in the United States;
 - (B) Projected total vehicle sales in California;
 - (C) Projected sales of vehicles in family in the United States; and
 - (D) Projected sales of vehicles in family in California.
 2. Actual Sales from prior three MYs. A manufacturer shall report their actual sales for the parameters set forth above. If data are not yet available for the model year immediately prior, a manufacturer may provide such data when it becomes available, but no more than 3 months after the beginning of the model year.
 - g. Example of Vehicle Label
 - h. Battery end of life plan
- (2) Warranty
- a. A manufacturer applying to certify at Level 1 is permitted to define their own warranty terms and conditions, if any. If a manufacturer does offer a warranty for the drivetrain and/or energy storage system, it must include defined warranty period for each subsystem (e.g., energy storage system, traction motor/generator, power electronics, etc.)
- (c) Level 2 Requirements
- (1) All Level 1 requirements also apply to Level 2 Certifications
 - (2) Battery Module Requirements
 - a. Battery modules used must conform to the packaging requirements of SAE J1797—Recommended Practice for Packaging of Electric Vehicle Battery Modules.
 - b. A manufacturer must submit all necessary documentation demonstrating that the battery modules meet the requirements of SAE J1797.
 - (3) Usable Battery Capacity/Energy

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- a. A manufacturer must perform a constant current discharge test at a rate of C/3 at 20 degrees Celsius per SAE J1798 of the battery pack to determine the usable battery capacity and usable battery energy.
 - b. Determining Usable Battery Capacity/Energy for different ESS offerings.
- (4) Required Connector. A manufacturer is required to install a connector meeting the requirements in Title 13 CCR 1971.1(H)(2) On-Board Diagnostic System Requirements--2010 and Subsequent Model-Year Heavy-Duty Engines.
- (5) Required Communications to a Scan Tool. A manufacturer is required to utilize a controller area network that meets the requirements in Title 13 CCR 1971.1(H)(3) On-Board Diagnostic System Requirements--2010 and Subsequent Model-Year Heavy-Duty Engines.
- (6) Required Heavy-Duty Electric Vehicle Symbols for Controls, Indicators, and Tell-tales
- a. A manufacturer shall include the required optical tell-tales that inform the operator of either correct operation or malfunctioning of the zero-emission powertrain components.
 - b. Reference potential symbols in SAE J2402...
- (7) Required On-Board Diagnostic Monitoring
- a. Energy Storage System
 1. Manufacturers shall submit a plan for Executive Officer approval of the monitoring strategy, malfunction criteria, and monitoring conditions for monitoring of the ESS state of health. The Executive Officer shall approve the plan upon determining that the manufacturer has demonstrated the monitor properly detects malfunctions and that the monitor is able to detect any ESS state of health fault that prevents utilization of the ESS in movement of the vehicle (e.g. the motor is unable to move the vehicle due to ESS deterioration).
 2. The OBD system shall monitor the ESS state of charge for malfunctions that result in any of the following:
 - (A) The state of charge cannot be controlled within the normal manufacturer-defined useable range intended for hybrid vehicle operation.
 - (B) The system is not able to maintain the state of charge required by the OBD system to enable other diagnostics.
 3. The OBD system shall monitor the ESS cell balancing system for proper functional response to computer commands. The OBD system shall detect a malfunction when the ESS cell balancing system can no longer maintain the individual cell voltages desired. In lieu of monitoring individual cell voltages, manufacturers may monitor the individual switches used to command cell balancing for proper functional response. If the OBD system does not determine cell balance using individual

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cell voltages, manufacturers shall submit a plan for Executive Officer approval of the monitoring strategy, malfunction criteria, and monitoring conditions for monitoring the ESS cell balancing system. In general, the Executive Officer will approve the plan if it includes functional monitoring of components used for cell balancing.

4. The individual electronic components that are used as inputs or outputs for the ESS (e.g., battery temperature sensors, battery voltage sensors, battery cells) shall be monitored in accordance with the requirements of sections XX
 5. For monitors of malfunctions specified under sections XX, manufacturers at a minimum shall store separate fault codes relating to ESS malfunctions pinpointing the smallest replaceable unit for in-use repair as defined by the manufacturer. Manufacturers may further pinpoint components and/or failure modes.
- b. Thermal Management Systems
1. ESS Thermal Management Systems
 - (A) The individual electronic input and output components that are used for ESS thermal management (i.e., heating or cooling) shall be monitored in accordance with the requirements of sections XXX. Electronic components used for battery thermal management and commanded solely by driver demand are exempt from this monitoring requirement.
 - (B) To the extent feasible, the OBD system shall perform a functional check of the cooling performance and, if applicable, heating performance.
 2. Inverter Thermal Management Systems
 - (A) The individual electronic input and output components that are used for inverter thermal management (i.e., heating or cooling) shall be monitored in accordance with the requirements of sections XXX. Electronic components used for inverter thermal management and commanded solely by driver demand are exempt from this monitoring requirement.
 - (B) To the extent feasible, the OBD system shall perform a functional check of the cooling performance and, if applicable, heating performance.
- c. Regenerative Braking: The OBD system shall detect a malfunction of a component when a failure disables the regenerative braking function or affects regenerative braking performance.
- d. Drive Motor: Manufacturers shall submit a plan for Executive Officer approval of the monitoring strategy, malfunction criteria, and monitoring conditions for the drive motor system. The Executive

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Officer shall approve the plan upon determining that the manufacturer has demonstrated that the monitor properly detects malfunctions, and that the monitor is able to detect any drive motor fault that prevents utilization of the motor in movement of the vehicle (e.g. the motor can no longer be used to move the vehicle).

(8) Graphical User Interface Requirements

- a. A manufacturer must display or make readily accessible without the need for additional tools, codes, etc... to the vehicle operator a graphical and/or numerical representation of the state of charge for the energy storage system, in a minimum of 5% increments, starting at 100%.
- b. A manufacturer must display or make readily accessible without the need for additional tools, codes, etc...to the vehicle operator a graphical and/or numerical representation of the remaining capacity of the energy storage system as a percent of the original usable battery energy, in a minimum of 5% increments, starting at 100%.

- (9) Level 2 Warranty. The warranty for the energy storage system must state the warrantable battery energy in units of KWh or capacity in units of Ah, as a percentage of the original usable battery energy or usable capacity as tested. A manufacturer may include other metrics, such as accumulated discharge cycles per pack, gross energy discharge throughput per pack, or any other relevant metric, so long as these metrics are displayed to the vehicle operator or made readily accessible without the need for additional tools, codes, etc...

(d) Level 3 Requirements

- (1) All Level 1 and 2 requirements also apply to Level 3 Certifications.

(2) Durability Demonstration

- a. A manufacturer must perform SAE J2288 - Life Cycle Testing of Electric Vehicle Battery Modules at the battery pack level. The testing will be performed until the end of life conditions identified in SAE J2288 are reached. Results must be reported in charge cycles and energy throughput until end of life is reached. The battery management system and thermal management system shall be used during the test and/or scaled to the pack level.
- b. A manufacturer may request to perform an alternate battery pack life cycle test. A manufacturer may justify the use of the alternative test based on... [Placeholder for Future Content]..
 1. The manufacturer must submit the alternative battery pack life cycle test plan for approval prior to performing testing.
 2. The manufacturer defined alternative battery pack life cycle test plan must include [Placeholder for Future Content]

(3) Useful Life

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- a. [Placeholder for Future Content]
 - (4) Recall
 - a. [Placeholder for Future Content]
 - (5) Level 3 Warranty
 - a. Energy Storage System. A manufacturer must provide a minimum 6 years or 200,000 KWh of energy throughput per pack to 80% of original usable energy.
 - b. All other ZEP components, subsystems, and drivetrain. A manufacturer must provide a minimum 2 years or 100,000 mile warranty.
 - (6) Service Information
 - a. Manufacturers of Heavy-Duty Zero-Emission Vehicles must comply with the Motor Vehicle Service Information requirements contained in Title 13, California Code of Regulations, Chapter 1, Motor Vehicle Pollution Control Devices, Article 2, Approval of Motor vehicle Pollution Control Devices (New Vehicles); Section 1969, Motor vehicle Service Information
- (e) Transit Bus Requirements [Placeholder for Future Content]
- (f) Aftermarket Conversions [Placeholder for Future Content]