

UPDATED INFORMATIVE DIGEST

PROPOSED ALTERNATIVE CERTIFICATION REQUIREMENTS AND TEST PROCEDURES FOR HEAVY-DUTY ELECTRIC AND FUEL-CELL VEHICLES AND PROPOSED STANDARDS AND TEST PROCEDURES FOR ZERO-EMISSION POWERTRAINS (ZERO-EMISSION POWERTRAIN CERTIFICATION REGULATION)

Sections Affected:

Amendments to California Code of Regulations, title 13, section 1956.8 (13 CCR 1956.8); California Code of Regulations, title 17, section 95663 (17 CCR 95663); and the "California Greenhouse Gas Exhaust Emission Standards and Test Procedures for 2014 and Subsequent Model Heavy-Duty Vehicles," last amended June 27, 2019, incorporated by reference in 17 CCR 95663. Adoption of the following document incorporated by reference in 13 CCR 1956.8: "California Standards and Test Procedures for New 2021 and Subsequent Model Heavy-Duty Zero-Emission Powertrains," adopted June 27, 2019.

Documents Incorporated by Reference (Cal. Code Regs., tit. 1, § 20, subd. (c)(3)):

The following documents are incorporated by reference in the "California Standards and Test Procedures for New 2021 and Subsequent Model Heavy-Duty Zero-Emission Powertrains":

- Society of Automotive Engineers International (SAE) Standard J1798: "Recommended Practice for Performance Rating of Electric Vehicle Battery Modules," as revised on July 8, 2008. Copyrighted.
- Section 1037.801, Title 40, Code of Federal Regulations, as last amended by United States Environmental Protection Agency (U.S. EPA) on July 1, 2015.

The following documents are incorporated by reference in the amended test procedure document entitled "California Greenhouse Gas Exhaust Emission Standards and Test Procedures for 2014 and Subsequent Model Heavy-Duty Vehicles," adopted October 21, 2014, last amended June 27, 2019:

- Section 86.1803-01, Title 40, Code of Federal Regulations, as last amended by U.S. EPA on July 1, 2011.
- SAE J2402: "Road Vehicles-Symbols for Controls, Indicators, and Tell-Tales," as revised on January 7, 2010. Copyrighted.
- International Organization for Standardization (ISO) 2575: "Road Vehicles – Symbols for controls, indicators, and tell-tales," as revised on July 1, 2010. Copyrighted.

Background and Effect of the Regulatory Action:

While California has made dramatic progress to improve its air quality, the State must continue its transition to significantly cleaner transportation and freight movement technologies to achieve its long-term climate and public health goals, which include:

- Reducing greenhouse gas (GHG) emissions to 40 percent below 1990 levels by 2030, as directed in Senate Bill (SB) 32, the California Global Warming Solutions Act¹;
- Reducing GHG emissions from the transportation sector to 80 percent below 1990 levels by 2050, as directed in Governor Brown's Executive Order B-16-2012²;
- Deploying 1.5 million zero-emission vehicles by 2025, as directed in Governor Brown's Executive Order B-16-2012;
- Deploying 5 million zero-emission vehicles by 2030, as directed in Governor Brown's Executive Order B-48-18³;
- Deploying 100,000 freight vehicles and equipment capable of zero-emission operation by 2030, as set forth in the California Sustainable Freight Action Plan⁴; and
- Achieving carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter, as directed in Governor Brown's Executive Order B-55-18⁵.

Actions to deploy zero-emission technology will be essential to meeting these goals. Accordingly, the California Air Resources Board's (CARB or the Board) 2016 State Strategy for the State Implementation Plan⁶, 2016 Mobile Source Strategy⁷, and the California Sustainable Freight Action Plan identify several measures intended to accelerate deployment of zero-emission technology in the mobile source sector. For heavy-duty on-road vehicles in particular, applications targeted by these measures include airport shuttle buses, transit buses, and delivery trucks. In addition, new zero-emission priorities have emerged since the publication of the aforementioned documents, and drayage trucks have also been identified for near-term deployment of zero-emission technology.

¹ Chap. 249, Stats. 2016 (Pavley) California HSC § 38566.

² [Governor Brown's Executive Order B-16-2012](http://www.gov.ca.gov/news.php?id=17472): <http://www.gov.ca.gov/news.php?id=17472>, accessed on September 12, 2018.

³ [Governor Brown's Executive Order B-48-18](https://www.gov.ca.gov/2018/01/26/governor-brown-takes-action-to-increase-zero-emission-vehicles-fund-new-climate-investments/): <https://www.gov.ca.gov/2018/01/26/governor-brown-takes-action-to-increase-zero-emission-vehicles-fund-new-climate-investments/>, accessed on September 12, 2018.

⁴ [Sustainable Freight Action Plan](http://www.casustainablefreight.org/documents/PlanElements/FINAL_07272016.pdf): http://www.casustainablefreight.org/documents/PlanElements/FINAL_07272016.pdf, accessed on September 12, 2018.

⁵ [Governor Brown's Executive Order B-55-18](https://www.gov.ca.gov/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf): <https://www.gov.ca.gov/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf>, accessed on October 29, 2018.

⁶ CARB; [Proposed 2016 State Strategy for the State Implementation Plan](http://www.arb.ca.gov/planning/sip/2016sip/2016statesip.pdf); May 17, 2016; <http://www.arb.ca.gov/planning/sip/2016sip/2016statesip.pdf>.

⁷ CARB; [2016 Mobile Source Strategy](http://www.arb.ca.gov/planning/sip/2016sip/2016mobsrc.htm), May 2016; <http://www.arb.ca.gov/planning/sip/2016sip/2016mobsrc.htm>.

Staff believes the vehicles that would be targeted by these measures operate in applications that are well-suited, both technically and economically, for the first launch of zero-emission technologies in the heavy-duty sector. In fact, the proposal for the Innovative Clean Transit Regulation was presented at the Board's September 2018 hearing and the proposal for the Zero-Emission Airport Shuttle Regulation was considered at the same February 2019 and June 2019 hearings as this regulatory action.

That said, the heavy-duty zero-emission industry is still relatively new and thus is subject to many of the issues associated with any emerging market. For example, there is still substantial variability in vehicle quality and support; purchasers are still relatively unfamiliar with zero-emission technology and its operational impacts; and there is limited historical information available by which to judge manufacturers. Given time, staff believes the market could eventually resolve these issues on its own. However, considering California's near-term zero-emission goals, it is necessary to take actions today to help stabilize the industry as the state begins to roll out its suite of heavy-duty zero-emission measures.

In order to provide this needed support, the regulatory action builds upon existing certification requirements set forth in California's Heavy-Duty Phase 2 Greenhouse Gas Standards (Phase 2)⁸ for on-road heavy-duty electric and fuel-cell vehicles and establishes an alternative certification procedure that helps ensure such vehicles are well-supported once deployed and consistent and reliable information is available to fleets when making purchase decisions. In addition, the regulatory action establishes new standards with certification requirements for zero-emission powertrains installed in heavy-duty electric and fuel-cell vehicles that certify to the alternative procedure.

Specifically, the Zero-Emission Powertrain Certification Regulation (ZEP Cert) includes the following:

New Alternative Certification Pathway for Heavy-Duty Electric and Fuel-Cell Vehicles

ZEP Cert establishes an alternative certification pathway for on-road heavy-duty electric and fuel-cell vehicles⁹ that builds upon existing heavy-duty Phase 2 requirements. The certification pathway will be available beginning with model year 2021. While ZEP Cert does not establish a mandatory certification process, it creates a framework that supports both new, "cutting-edge" technologies (i.e., early along the commercialization arc) as well as those that have demonstrated commercial viability. Future zero-emission measures could incorporate the alternative certification pathway as a requirement. Until then, manufacturers, at their own discretion, can certify a heavy-duty electric or fuel-cell vehicle to either the existing Phase 2 requirements or the alternative pathway requirements.

⁸ CARB, [Phase 2 and Tractor-Trailer Amendments Regulation](https://www.arb.ca.gov/regact/2018/phase2/phase2.htm),

<https://www.arb.ca.gov/regact/2018/phase2/phase2.htm>, accessed September 10, 2018.

⁹ ZEP Cert applies to medium-duty electric and fuel-cell vehicles (from 8,501 through 14,000 pounds gross vehicle weight rating) certified as incomplete vehicles.

a. Required Use of a Certified Zero-Emission Powertrain

In order to certify a vehicle family in accordance with the alternative vehicle certification pathway, the vehicles within said family are required to use a zero-emission powertrain that is certified in accordance with the zero-emission powertrain requirements (further described below) established by ZEP Cert. While existing heavy-duty Phase 2 requirements do not include a mechanism to certify a zero-emission powertrain, ZEP Cert establishes a separate zero-emission powertrain certification process as part of the regulation to better accommodate the multi-stage manufacturing process of heavy-duty vehicles today.

b. Labeling

The ZEP Cert provisions require vehicle manufacturers to include a compliance statement on their Phase 2 vehicle labels indicating if the ZEP Cert certification pathway was used, enabling these vehicles to be identified in the field.

c. Purchase Guidance

Manufacturers certifying through the ZEP Cert pathway are required to provide purchasers with a prescribed guidance statement identifying considerations that should be made when choosing a heavy-duty electric or fuel-cell vehicle. The list of considerations includes (among others) range, top speed, maximum grade, and impacts of vehicle load and battery degradation on performance.

The manufacturer is also required to provide a detailed description to the purchaser of its vehicle diagnosis and repair process and the implications of said process on repair timeframes and potential vehicle transportation costs.

While providing a battery-capacity warranty is not required, manufacturers are required to ensure that whatever coverage is provided, even if no coverage, it is explicitly disclosed to the purchaser at the time of sale.

Given that zero-emission technologies are still unfamiliar to many of the fleets who will be considering such technologies in the near-term, these provisions help ensure consumers consider the appropriate parameters when selecting a particular vehicle model. The intent of these provisions is to increase the likelihood that a fleet chooses a heavy-duty electric or fuel-cell vehicle that fits its operational needs.

d. Repairability Provisions

Vehicle manufacturers certifying through the ZEP Cert pathway are required to make available their service manual as well as any required service tools to third-party repair facilities at reasonable cost. The manufacturer may require special training in order to gain access to the service manual and tools.

The intent of these provisions is to help increase the efficiency of the repair network to reduce repair timeframes and potential vehicle transportation costs.

e. On-Board Vehicle Information

ZEPCert requires that certain vehicle information be accessible on-board to the fleet owner, such as *battery energy used per trip* and *remaining usable battery capacity*. These parameters will help fleet owners determine the efficiency of a particular vehicle or driver as well as provide the ability to assess the condition of a powertrain, which would be useful during a resale transaction, for example.

f. Fuel-Fired Heaters

Specific emission and operational requirements are established for fuel-fired heaters used on heavy-duty electric and fuel-cell vehicles. Specifically, fuel-fired heaters are required to meet the Low Emission Vehicle II program's Ultra Low Emission Vehicle standards¹⁰ and demonstrate zero-evaporative emissions under any and all possible operational modes and conditions. ZEPCert aligns fuel-fired heater requirements with those set forth in the LEV II program and adds clarity to the existing Phase 2 certification procedures.

New Emission Standards for Zero-Emission Powertrains

ZEPCert establishes new zero-emission GHG and criteria pollutant standards and certification requirements for 2021 model year and subsequent zero-emission powertrains. Certifying to the zero-emission powertrain standards is voluntary, except for those powertrains installed in heavy-duty electric and fuel-cell vehicles certified in accordance with the ZEPCert certification pathway.

A "powertrain" includes components, such as the energy storage system, the electric motor, and on-board charger, which are responsible for the storage, delivery, and conversion of energy within the vehicle to mechanical power.

a. Standardized Battery Test for Battery-Based Powertrains

Currently, there is no one procedure all manufacturers use to determine the usable battery capacity. Therefore, while battery-capacity information is widely cited (e.g., in vehicle marketing materials), the information cannot be reliably used to compare product offerings.

ZEPCert establishes a standardized battery-capacity test for certification under the alternative certification pathway. Specifically, the regulation requires the use of the constant current battery depletion test set forth in the SAE Standard J1798, "Recommended Practice for Performance Rating of Electric Vehicle Battery Modules," or another test procedure that is substantially similar. While this test does not provide

¹⁰ Title 13, California Code of Regulations, Section 1961

information on actual vehicle range, it provides a useful reference point by which different battery-based powertrains can be compared.

Fuel-cell powertrains without plug-in capabilities are not subject to this requirement.

b. Powertrain Monitoring and Diagnostic Strategy Information

ZEP Cert requires powertrain manufacturers to describe the monitoring and diagnostic strategies they use. ZEP Cert does not, however, dictate how a manufacturer *should* monitor a powertrain or diagnose powertrain problems. The information provided under these provisions will help staff understand potential causes of, and solutions to, problems experienced by heavy-duty electric and fuel-cell vehicles, which could help inform the development of future zero-emission measures. Staff could also use this information to validate the effectiveness of zero-emission powertrain recall repairs should in-use problems arise.

c. Repairability Provisions

The powertrain manufacturer is required to make available its internal service manual as well as any required service tools to third-party repair facilities at reasonable cost. The manufacturer may require special training in order to gain access to the service manual and tools.

This requirement will help improve the efficiency of the repair network for such powertrains, thereby reducing repair timeframes and potential vehicle transportation costs.

d. Standardized Connector and Compatibility with Automotive Scan Tools

ZEP Cert establishes the requirement to use a diagnostic connector that meets the requirements set forth in California's On-Board Diagnostics regulations¹¹ or an alternative connector approved by the Executive Officer. It also requires that malfunction codes and certain powertrain parameters be readable by a generic automotive scan tool.

This requirement will help improve the efficiency of the repair network for such vehicles and powertrains, thereby reducing repair timeframes and potential vehicle transportation costs.

e. Labeling

The labeling provisions will require powertrain manufacturers to affix a label on each powertrain assembly that includes the following information:

¹¹ Title 13, California Code of Regulations, Section 1971.1

- Manufacturer Name;
- Compliance Statement, indicating that the zero-emission powertrain has been certified to the requirements;
- Certification Family Name;
- Model Code, identifying the specific configuration; and
- Build Date

The labeling requirement will allow consumers to identify powertrains certified to the alternative pathway requirements. In addition, the labeling requirements also enable these powertrains to be identified in the field, either for compliance or research purposes.

Warranty and Recall

Each powertrain certified in accordance with the alternative pathway will be required to be covered, at a minimum, by a 3-year/50,000 mile warranty against workmanship and defects. In addition, other warranty requirements analogous to those for emission-control components, such as recall provisions, will apply.

These provisions will help ensure heavy-duty electric and fuel-cell vehicles are well supported once deployed. By ensuring such vehicles are adequately repaired, or removed from commerce, if and when problems arise, potential “poisoning” of the market can be prevented.

Objectives and Benefits of the Regulatory Action:

In its continuing effort to combat poor air quality and climate change, California has set aggressive near- and long-term zero-emission goals. To help achieve those goals, staff has identified several mobile source measures to help accelerate the transition to zero-emission technology. Among those measures are ones that specifically target heavy-duty trucks and buses. While the applications targeted by these measures have been determined to be well-suited for zero-emission technology today, both technically and economically, the success of those measures will depend on whether the actual heavy-duty electric and fuel-cell vehicles deployed are as effective as the internal combustion vehicles they replace. ZEP Cert is expected to increase the likelihood that such vehicles are successful in their intended applications through certification requirements that help ensure heavy-duty electric and fuel-cell vehicles are well supported once deployed and fleet purchasers are provided with consistent and reliable information when making purchase decisions.

While the certification pathway established by ZEP Cert is optional, staff expects it to be incorporated as a requirement in future zero-emission measures. In addition, manufacturers can, at their discretion, choose to certify through the certification pathway even if not required, in order to gain a potential market advantage by “proving” their technology over a more-stringent certification process. Therefore, ZEP Cert encourages the development of more-robust heavy-duty electric and fuel cell vehicles, and to the extent that certified products experience greater utilization (due either to increased

vehicle deployments or more-optimal vehicle performance), ZEP Cert could benefit California, in terms of both the advancement of the zero-emission market as well as the potential displacement of emission-producing internal combustion engines.

Furthermore, disadvantaged communities are expected to benefit from the transition of the heavy-duty sector to zero-emission technologies. Most, if not all, of CARB's planned heavy-duty zero emission measures are expected to have the greatest emission impact in disadvantaged communities because these communities are disproportionately impacted by heavy-duty truck traffic. While benefits are not directly attributable, the regulation is expected to benefit disadvantaged communities to the extent that it will help ensure the success of CARB's other zero-emission efforts.

The Board's Regulatory Action:

At its February 21, 2019, public hearing, the Board considered the proposed Zero-Emission Powertrain Certification Regulation for adoption and approved Resolution 19-7. The resolution directed the Executive Officer to consider comments submitted during the public comment periods and make any further modifications to the proposal available for public comment for at least 15 days. It also directed the Executive Officer to evaluate all comments received during the public comment periods, including comments raising significant environmental issues, and prepare written responses to such comments. The Executive Officer was further directed to present to the Board, at a subsequently scheduled public hearing, staff's written responses to environmental comments and the final environmental analysis for consideration for approval, along with the finalized amendments to the regulation for consideration for adoption.

In accordance with Government Code section 11346.8, at its second public hearing, held on June 27, 2019, the California Air Resources Board adopted Resolution 19-15, which approved amendments to section 1956.8, title 13, California Code of Regulations and section 95663, title 17, California Code of Regulations, as set forth in Attachment A of the resolution; amendments to the incorporated "California Greenhouse Gas Exhaust Emission Standards and Test Procedures for 2014 and Subsequent Model Heavy-Duty Vehicles," as set forth in Attachment B of the resolution; and the adoption of the incorporated "California Standards and Test Procedures for New 2021 and Subsequent Model Heavy-Duty Zero-Emission Powertrains," as set forth in Attachment C of the resolution. Resolution 19-15 also approved staff's written responses to environmental comments and the final environmental analysis. The resolution reflects all modifications proposed as part of the Notice of Public Availability of Modified Text and Availability of Additional Documents and Information (15-Day Notice) released on May 13, 2019. On June 14, 2019, CARB broadcasted and posted the [public agenda](https://ww2.arb.ca.gov/ma062719) (<https://ww2.arb.ca.gov/ma062719>) for the June 27, 2019, hearing.

On July 29, 2019, the California Air Resources Board (CARB or Board) submitted the Final Statement of Reasons (FSOR) for the rulemaking action entitled "Proposed Alternative Certification Requirements and Test Procedures for Heavy Duty Electric and Fuel-Cell Vehicles and Proposed Standards and Test Procedures for Zero Emission Powertrains (Zero-Emission Powertrain Certification Regulation)" to the Office of Administrative Law

(OAL) for its review and approval. On September 10, 2019, CARB submitted a request to withdraw the rulemaking file for this regulatory action to OAL, which OAL granted.

Summary of 15-Day Notice Modifications:

The 15-Day Notice presented modifications to the regulatory text and to the incorporated test procedures in response to public comments made during the 45-day public comment period and during the February 21, 2019, public hearing. For an explanation of the changes made as a result of the 15-Day Notice please see the Final Statement of Reasons for this Rulemaking. The 15-Day Notice also placed an additional document into the regulatory record and added a new addendum to the Initial Statement of Reasons (ISOR). The text of the proposed regulatory modifications and a new addendum were posted on [CARB's website](https://ww2.arb.ca.gov/rulemaking/2019/zeperc2019) at <https://ww2.arb.ca.gov/rulemaking/2019/zeperc2019>, accessible to all stakeholders and interested parties.

The comment period extended from May 13, 2019, to May 28, 2019, pursuant to Government Code section 11346.8. Staff evaluated all comments received during the 45-Day and 15-day comment periods, as well as public comments received during the two Board hearings.

Additional Modifications

After the close of the 15-day comment period, the Executive Officer determined that no additional modifications should be made to the regulation, with the exception of non-substantial changes, including punctuation and formatting corrections and corrections of typographical errors, which are fully described in the Final Statement of Reasons for the Rulemaking and in the Addendum to the Final Statement of Reasons for the Rulemaking.

Comparable Federal Regulations:

ZEPCert amends California's Phase 2 regulations, which largely aligns with U.S. EPA and the National Highway Traffic Safety Administration's Phase 2 regulations (Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles – Phase 2, 81 Federal Register 73478-74274, (October 25, 2016)). Specifically, ZEPCert establishes an optional certification pathway for on-road heavy-duty electric and fuel-cell vehicles that contains enhanced (i.e., more-stringent) requirements.

In addition, ZEPCert establishes new standards and certification procedures for zero-emission powertrains. There are currently no federal emission regulations that apply to zero-emission powertrains.

**An Evaluation of Inconsistency or Incompatibility with Existing State Regulations
(Gov. Code, § 11346.5, subd. (a)(3)(D)):**

During the process of developing the regulatory action, CARB conducted a search of any similar regulations on this topic and concluded these regulations are neither inconsistent nor incompatible with existing state regulations.