Appendix F-8

Purpose and Rationale

§ 1962.6. Battery Labelling Requirements

Subsection 1962.6(a). Applicability.

Purpose

The purpose of this subsection is to state which type of vehicles the labeling requirement applies to for 2026 and subsequent model years. These vehicles include ZEVs, PHEVs, conventional hybrid electric vehicles (HEVs), and 48-volt hybrid electric vehicles (48V hybrid). This subsection also defines "traction battery" for this proposed section 1962.6.

Rationale

This subsection is necessary to explicitly state the applicability of the requirements of this section 1962.6 and identify the vehicles to which the battery label requirements apply. As further described in ISOR Section III.D.5, having a battery appropriately labeled with information about its chemical and physical makeup, manufacturer, and an identifier linking to a website with safety information is necessary for consumer confidence in ZEVs and ultimately securing the needed emissions reductions. With information about the battery readily available, consumers can be assured that any ZEV servicer will have the requisite information whenever needed to service, reuse, recycle, or dispose of the battery, and will be properly informed for safe and appropriate servicing. This will assure owners that the battery in their vehicle will perform as intended and will not become a liability at the end of its useful life in a vehicle, thus encouraging consumers to transition from conventional vehicles to BEVs and displacing emissions as intended. Moreover, batteries contain "critical energy materials" that may have limited supply and few substitutes. Efficient management and recycling of these materials help ensure adequate supply for the number of ZEVs needed to displace conventional vehicles and are supported by consistent labeling.

Traction batteries are contained in many different types of vehicles, contain unique chemistries and hazardous materials, and present a liability to the State of California at the end of life. It is therefore also imperative that these batteries are properly labeled to ensure safe handling and disposal. Besides assuring owners that ZEV batteries will function as intended and not become liabilities, the labeling requirements will promote secondary uses and reduce disposal costs by providing reliable, complete information about the physical characteristics of the batteries. This will reduce lifecycle costs for ZEVs, assuring they are cost effective, and thus making it more likely they will be cost-competitive with conventional vehicles and will reduce emissions as intended.

"Battery" is defined elsewhere in the CCR and associated test procedures, and in those instances is not meant to include conventional HEVs or 48V hybrids. Therefore, this subsection is also necessary to define the term "traction battery" as it applies to

this section 1962.6, to ensure all applicable vehicles and batteries are included in the labeling requirements of this section.

Subsections 1962.6(b) and (b)(1). Required Label Information.

Purpose

The purpose of subsection (b) is to require a permanent battery label on all ZEVs, PHEVs, HEVs, and 48V hybrids. This subsection also allows manufacturers the option of adding the required information to an existing label. The purpose of subsection (b)(1) is to introduce the required information, outlined in the subsequent subsections (A) through (E).

Rationale

Subsection (b) is necessary to make explicit the requirement for manufacturers to place permanent labels on the batteries in all applicable vehicles, according to the requirements further specified. Vehicle manufacturers already employ a range of physical part labels; these can include digital identifiers to link parts to additional information sources. This provides manufacturers a pathway to consolidate label information and conserve surface area of battery modules.

Subsection (b)(1) is necessary to introduce and organize the following subsections containing the specific battery label information. The subsequent subsections make explicit the elements of the physical label, describe the information in each element, and describe appropriate assessment methodology for each element. As described above under subsection (a), having this information labeled on the battery is necessary for consumer confidence in ZEVs and ultimately securing the needed emissions reductions. With this information readily available, consumers can be assured that any ZEV servicer will have the requisite battery information whenever needed and will be properly informed for servicing. This is further bolstered by ensuring this information is in a consistent format across the vehicle population.

Subsection 1962.6(b)(1)(A).

Purpose

The purpose of this subsection is to describe the specific format for including information on the battery chemistry and manufacturer on the physical label.

Rationale

Battery chemistry, cathode type, anode type, manufacturer, and date of manufacture are all critical pieces of information for battery service and maintenance, as well as for any recycling or disposal. Therefore, having these labeled on the battery serves to ensure consumers and servicers that requisite information will be readily available, which is important for expanding the ZEV market. Having the information available will incentivize markets for servicing, repairing, and reusing vehicle batteries. This will ensure ZEV performance and cost are competitive with conventional vehicles,

supporting ZEVs as capable of displacing conventional vehicles and their associated emissions.

The proposal is also consistent with recommendations identified in the Draft Recommendations of the Lithium-ion Battery Recycling Working Group to address challenges in identifying used batteries. Staff proposes to use the SAE J2984 standard to promote consistency with potential future efforts and current efforts in other markets.

Staff's proposal is to include information on the battery chemistry, manufacturer, and date of manufacture on the label. The battery chemistry information should provide sufficient information on the cathode and anode chemistry to facilitate sorting and identification. Staff recommends the use of an existing standard, SAE J2984 Chemical Identification of Transportation Batteries, as the model for nomenclature on the label. The SAE J2984 standard builds on existing international conventions on battery labelling and is based on input from manufacturers. SAE J2984 provides a succinct description of terms to represent the cathode and anode formulations.

Battery technology is rapidly developing, with new chemistries evolving faster than standard development. To this end, this subsection is also necessary to allow for an alternative identifier to ensure the label is both useful in the rapidly evolving environment of battery technology while still maintaining some consistency with industry terminology. Thus, if technology needs require more rapid updates to this standard with respect to cathode and anode formulations, Executive Officer approval shall be granted if the proposed identifier is consistent with SAE J2984 or with terminology generally used within the battery manufacturing industry. For simplicity, manufacturers would seek, and the Executive Officer would review and approve, alternate identifiers as part of the certification application process, in which samples of the label are required to be provided already.

Subsection 1962.6(b)(1)(B).

Purpose

The purpose of this subsection is to state requirements for providing battery system voltage on the battery label and describes the relevant standards for estimating the voltage.

Rationale

As described in ISOR Section III.D.5, information on battery voltage is important for servicing, safe handling, identification, and transport. Voltage is important information for potential testing and reuse by downstream consumers—comparing current voltage to nominal voltage is a key initial diagnostic test to evaluate the condition of used cells. Zero-emission and electric vehicle battery systems can be designed to operate at high voltages (in excess of 480 volts) and pose significant risks to workers and equipment including a heightened risk of fire from misidentified batteries. Having this

information labeled on the battery supports the expansion of the ZEV market and reduction of emissions by ensuring consumers and servicers that requisite information will be readily available.

To estimate the system voltage, staff proposes following the testing standard outlined under the SAE J2288 "Life Cycle Testing of Electric Vehicle Battery Modules", which is incorporated by reference. The testing procedure outlined under the SAE J2288 standard is identical to the AABC life cycle testing standard and is based on input from manufactures and other industry stakeholders. The SAE J2288 standard outlines a series of reference performance tests that can be used to determine the nominal voltage and are also used to determine battery capacity:

a. A Capacity Test at the C/3 constant current rate,
b. A Dynamic Capacity Test to a maximum of 100% of rated capacity, and
c. A Peak Power Test.

The use of these reference performance tests will yield a comparable estimate of battery voltage in real-world conditions. While testing procedures may continue to evolve, the SAE J2288 standard provides a consistent and preferable alternative to a manufacture-rated voltage based solely on a design standard or formation cycle data.

Subsection 1962.6(b)(1)(C).

Purpose

The purpose of this subsection is to require the individual battery cell count on the label.

Rationale

As described in ISOR Section III.D.5, information on the configuration of the battery pack is important information for servicing and maintaining the battery as well as potential recyclers, handlers, or third-party reuse enterprises. For replacement or repair of a potentially defective module by a third-party repair person, information on cell count is useful for comparing total pack energy. For aftermarket part replacement, changes in the cell count could result in battery systems with similar nominal voltage and capacity ratings, but different voltage response. For example, two battery systems with identical nominal voltage and rated range could be composed of different cell counts. Information on the battery configuration is key for battery repurposers, and making this information readily available can reduce the costs of testing and diagnostics.

Subsection 1962.6(b)(1)(D).

Purpose

The purpose of this subsection is to require the rated capacity to be included on the label and how information on the battery storage capacity in kilowatt hours should by measured.

Rationale

Battery storage capacity is important information for potential consumers of used vehicles or after-market repair or replacement of battery systems. It is also highly valuable information for downstream processors and remanufacturers. Data on the rated capacity can be used to evaluate battery degradation by repurposers and be used by resellers to differentiate or price products.

In order to determine the battery rated capacity, Staff recommends the use of an empirical standard for performance testing. Adopting a uniform standard for estimating capacity would provide more comparable estimates for replacement parts as opposed to a manufacture-disclosed rating. The SAE J2288 standard outlines a clear series of reference performance tests to be used to evaluate the battery capacity, as well as defines a process to evaluate capacity through repetitive discharge testing. These tests are based on widely adopted industry standards and are commonly employed across the battery industry to evaluate the performance characteristics of battery systems and cells. Therefore, Staff expects that including this information will require minimal additional testing of batteries to provide this information on the label.

Subsection 1962.6(b)(1)(E).

Purpose

The purpose of this subsection is to require the inclusion of a digital identifier on the physical label, which links to a website with more information about the traction battery. This subsection also allows manufacturers to use a common digital identifier for batteries differing in date of manufacture. The data repository website is further described in subsection (c).

Rationale

The digital identifier, or MicroQR code, is to provide a link to the data repository website for the battery system. The identifier would provide a link to directly access additional information beyond that included on the physical label, as there is limited amount of surface area on each battery unit. The battery data repository will provide an additional and dynamic resource for tracking important information on manufacturing, rated performance, and safety. Staff's proposal aligns with traceability programs proposed by the Global Battery Alliance and the California AB 2832 Draft Recommendations and ensures needed battery information can be accessed easily

and efficiently. As previously noted, having this battery information supports the expansion of the ZEV market and reduction of emissions by ensuring consumers and servicers that requisite information will be readily available.

Additionally, it is expected that batteries that are identical in all but date of manufacture could be on the same vehicle. The second clause of this subsection is necessary to allow manufacturers with identical batteries, differing only in date of manufacture can be linked to the same data repository website.

Subsection 1962.6(b)(2). Label location.

Purpose

The purpose of this subsection is to describe the location where the physical label is located on the battery, including on each portion of the battery in cases where portions of the battery pack may be replaced or repaired. This subsection also permits manufacturers to request an alternate label location.

Rationale

This subsection is necessary to make explicit where the physical label must be located on the battery. The physical label is to appear on the battery system enclosure such that it is available and visible when the battery system is serviced, removed, or replaced. Common traction battery systems are composed of a large number of individual cells, combined into modules and packs designed to achieve required energy and power specifications and manage the state of charge. It is therefore necessary for the physical label to appear on the enclosure of each portion of the battery system that is serviceable, removable, or replaceable to ensure that information on the battery system contained on the physical label will be available if vehicle battery systems are serviced separately or dismantled prior to reuse or refurbishment. The presence of a physical label on each portion of the battery pack will also reduce barriers to recycling and collection of batteries.

This subsection also allows for alternate label locations in the event that application of the label to the battery would render the label illegible. In this instance, manufacturers may request Executive Officer approval of such an alternate location as part of the manufacturer's application for certification, in which samples of the label are required already. This provision is necessary to provide flexibility in instances where having a label on the battery is infeasible. The Executive Officer will approve of an alternate label location adjacent to the battery upon determining that having the label on the battery itself would render the label illegible; for simplicity, this approval will be part of the vehicle's certification.

Subsections 1962.6(b)(3)(A) and (B). Label Format.

Purpose

The purpose of these subsections is to describe the format of the physical label in terms of how text is printed and the specifications for the digital identifier.

Rationale

These subsections are necessary to make explicit the required label format and to ensure that information on the label is displayed in a clear, consistent, and legible format (e.g., block letters and contrasting with the background). The digital identifier would consist of a symbol-based compact detection pattern which provides a unique and serializable identifier for that product. Staff proposes the digital identifier follow an existing and widely adopted standard – MicroQR code requirements of ISO 18004:2015, "Information technology — Automatic identification and data capture techniques — QR Code bar code symbology specification". MicroQR codes are currently employed by vehicle and parts manufacturers to identify products and offer a number of improvements compared to traditional bar codes. This ensures any servicer, handler, recycler, reuser, or rebuilder can easily access essential information contained on the battery label and the data repository website.

Subsection 1962.6(c). Data Repository Website Requirements.

Purpose

The purpose of this subsection is to require manufacturers to make information available on a web-based data repository connected to the digital identifier included on the label. This subsection lays out the specific requirements for content, accessibility, maintenance, and availability of information on the website.

Rationale

A data repository website provides a centralized space for traction battery information that is easily updatable by manufacturers and not limited with respect to the scope of information provided. The data repository website thus addresses space constraints of the physical label and ensures that information related to the vehicle's traction battery remains accessible in the event the physical label is damaged or removed. In addition to the information contained on the physical label, the data repository website will provide information on hazards, recalls, and safe disposal as described in the subsequent subsections. This information would be provided by the original equipment manufacturer of the vehicle when the vehicle is sold. The inclusion of this section ensures a uniform approach to information provided by manufacturers or their designees, and that key information will be available to consumers, servicers, and recyclers over for the entirety of the vehicle life. As previously noted, having this battery information readily available supports the emission reduction goals of this proposal by addressing existing consumer challenges with ZEVs (e.g., see ISOR Sections III.A.5 and III.D.5).

Subsections 1962.6(c)(1) and (c)(1)(A). Information requirements.

Purpose

The purpose of these subsections is to describe the required information and data to include on the data repository website. Manufacturers must include all information on the physical label on the website.

Rationale

These subsections are necessary to ensure the information on the physical battery label is also readily available online. This information is included to ensure that information related to the vehicle's traction battery remains available in the event the physical label is damaged or removed. Allowing for manufacturers that are grouping batteries that are materially identical and differ only in date of manufacturer to maintain one website for all batteries so long as each date of battery manufacture is provided is necessary to minimize compliance burdens while still ensuring the requisite information is readily available.

Subsection 1962.6(c)(1)(B).

Purpose

This subsection requires disclosure on the data repository website of hazardous substances in the traction battery.

Rationale

This subsection is necessary to describe the hazardous substances required for disclosure, as defined by California Occupational Health and Safety Regulations, listed in CCR, title 8, section 339. Products containing hazardous substances should be properly labeled with hazard symbols and/or other warnings so that shippers, handlers, and customers are aware of the risks. In the event of an accident or routine service, emergency services, handlers, or passers-by may require information on what substances are involved. Disclosure of hazardous materials is also important for reverse logistics and could reduce barriers to efficient sorting and recycling.

Subsection 1962.6(c)(1)(C).

Purpose

This subsection requires product safety information and any recall information to be provided through the data repository website.

Rationale

Staff's proposal to include safety information and any recall information in the repository website increases the availability of this information to consumers, servicers, handlers, and recyclers, ensuring ready access to important safety information. Recalls protect consumers and handlers from products that may cause injuries or create

unexpected hazards. Product safety advisories can also be used by manufacturers to provide information on voluntary product recalls or incidents of defects.

Subsection 1962.6(c)(1)(D). Safe disposal information.

Purpose

This subsection requires the data repository website to include safe disposal information.

Rationale

This subsection is necessary to avoid risks of improper disposal and to promote safe battery handling during end of life. Improper disposal could include combining with other recycling waste streams (for example, NiMH batteries and lithium chemistries), as well as mixing with municipal waste streams. The risks of disposal with household waste may be low, but improper disposal of batteries can significantly pollute the environment and pose a threat to human health. Batteries also have the potential to cause physical injury to workers and can present hazards during storage or transport due to risk of fire or materials leakage. Safe disposal information could also include the appropriate state of charge for end-of-life scenarios. Having this information readily available helps remove a barrier to ZEV market expansion.

Subsections 1962.6(c)(2)(A) through (J). Website access and maintenance.

Purpose

The purpose of these subsections is to make explicit accessibility and maintenance requirements for the data repository website. This includes requirements for functionality on mobile platforms, availability to the public without a fee, being in English and other languages in readable font size, availability at all times, accessibility to disabled individuals, being maintained, and providing contact information.

Rationale

These subsections are necessary to ensure the required data repository websites are maintained, up to date, easily navigable and understandable, and accessible to all. As previously noted, having this battery information readily available supports the emission reduction goals of this proposal by addressing existing consumer challenges with ZEVs (e.g., see ISOR Sections III.A.5 and III.D.5).

Subsection 1962.6(c)(3). Information Availability Requirements.

Purpose

The purpose of this subsection is to define how long the information required by this section is to be made available and retained.

Rationale

This subsection is necessary to ensure requisite battery information remains available for as long as it is likely to be useful. Most vehicles are on the road for at least 15 years. As discussed in ISOR Section III.D.5, beyond the vehicle, traction batteries can enter into secondary use applications. The information provided through the website and digital identifier should be made accessible to all potential downstream consumers or handlers until the battery system is recovered for recycling. Battery systems have long service lifetimes; to ensure products can continue to be identified after being retired in one form, this information must remain accessible for an extended period.

Subsection 1962.6(d)(1). Enforcement of Label and Data Repository Website.

Purpose

The purpose of subsection (d)(1) is to require sample labels as part of the vehicle certification application, and, in the case that the label does not comply, that the Executive Officer will require the label be modified to comply.

Rationale

This subsection is necessary to provide CARB with the required information needed at the time of certification to verify a manufacturer's label is meeting the requirements of this proposed section. These requirements are in line with the way CARB enforces other label requirements such as the Vehicle Emission Control Information (VECI) label, with provides consistency in expectations and minimizes burdens. This subsection also specifies that Executive Officer approval of the battery label is part of certification under section 1962.4, and that the Executive Officer will not approve a label (and therefore not certify a vehicle) if it does not meet the requirements of this section. This is necessary to notify manufacturers that proper battery labeling is a component of certification and that certification will not be approved unless the battery label meets the requirements of this section.

Subsection 1962.6(d)(2).

Purpose

The purpose of this subsection is to specify that the Executive Officer will require corrective action or recall of any vehicle with a battery label that does not conform to this section 1962.6.

Rationale

This subsection is necessary to make explicit the enforcement action a manufacturer will face where noncompliant labels are used in place of ones that were approved at the time of vehicle certification. This ensures that compliant labels are enforced beyond certification, so that this needed information remains accessible and available.

Subsection 1962.6(d)(3). Data Repository Website Audit.

Purpose

The purpose of this subsection is to specify that the Executive Officer may audit the data repository website to ensure compliance with subsection (c).

Rationale

This subsection is necessary to make explicit that the Executive Officer may monitor data repository websites from time to time for compliance with the requirements of this section 1962.6, as well as to clarify that such monitoring does not impose any obligations on manufacturers. In other words, this subsection provides manufacturers with advance notice that CARB may independently evaluate the manufacturers' data repository website required under this section for compliance with this section. As previously noted, having this battery information readily available supports the emission reduction goals of this proposal by addressing existing consumer challenges with ZEVs (e.g., see ISOR Sections III.A.5 and III.D.5).

Subsection 1962.5(e) Severability.

Purpose

The purpose of this subsection is to establish that if one or some of the provisions in the proposed regulation are deemed unenforceable or invalid, the remainder shall continue to be in effect.

Rationale

This subsection is necessary to preserve the overall intent of what the proposed regulation is set to achieve, even if unforeseen issues arise with enforcing any individual term of the proposed regulation.