

**DOCKETED**

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California Energy Commission

## ISO 15118 Charger Communication and Interoperability Proposal

The California Energy Commission (CEC) is proposing to improve charger communication capability and interoperability for its light-duty electric vehicle charger investments. This proposal will help ensure that CEC-funded chargers are hardware-ready to support current and upcoming vehicle features, critical vehicle-grid integration capabilities, and an easier-than-gas user experience. Under this proposal, light-duty vehicle chargers funded by the CEC must be hardware-ready for ISO 15118 communication in late 2022 for DC equipment and in mid 2023 for AC equipment. These proposed guidelines would apply to future light-duty vehicle chargers funded by the CEC, and do not apply to chargers installed without CEC funds. Other non-CEC charging infrastructure programs may reference these updated CEC guidelines, and the CEC is separately exploring flexible demand appliance standards.

These updated guidelines focus on ISO 15118 readiness for CEC-funded chargers, and the CEC emphasizes that other pathways for charging-related communication, such as vehicle telematics or mobile applications, remain welcome and are unaffected by this update.

### Background

ISO 15118 is a standard supporting high-level communication between the vehicle and the charger, and is already widely used for basic DC charging controls with the Combined Charging System (CCS). ISO 15118 also supports use cases that help coordinate charging with grid signals and improve the charging experience. For example, some vehicles today support ISO 15118's Plug and Charge feature, allowing drivers to automatically start and pay for a charging session simply by plugging in. Given the growing use and capabilities of ISO 15118, CEC staff propose that future light-duty vehicle chargers installed using CEC funds should be hardware-ready for ISO 15118.

### ISO 15118-Ready Hardware Guidelines

A charger that is "ISO 15118-ready" or "hardware-ready for ISO 15118" is capable of:

1. Powerline carrier (PLC) based high-level communication as specified in ISO 15118-3.
2. Secure management and storage of keys and certificates.
3. Transport Layer Security (TLS) version 1.2; additional support for TLS 1.3 or subsequent versions is recommended to prepare for future updates to the ISO 15118 standard.
4. Remotely receiving updates to activate or enable ISO 15118 use cases.
5. Connecting to a backend network.

ISO 15118-ready chargers must have onboard hardware to support the above capabilities, but are not required to actively support specific ISO 15118 use cases. For example, an ISO 15118-ready charger should have the onboard hardware needed for Plug and Charge, but is not required to have Plug and Charge software implemented. Once these updated guidelines take effect, charging providers must attest that their hardware supports these capabilities to be eligible for CEC funding. The CEC recommends that equipment manufacturers self-test for ISO 15118-3 conformance using ISO 15118-5.

ISO 15118-ready chargers must be capable of selecting the appropriate communication protocol used by the vehicle. AC chargers must continue supporting pulse-width modulation control using IEC 61851 and shall be capable of supporting, at minimum, ISO 15118-2 (and should, when feasible, additionally support ISO 15118-20). DC chargers must continue supporting DIN 70121 and shall be capable of supporting, at minimum ISO

15118-2 (and should, when feasible, additionally support ISO 15118-20). The CEC makes no determinations on processor or memory specifications for the supply equipment charge controller.

ISO 15118-ready chargers do not prevent the use of other communication pathways (such as vehicle telematics) and can continue to support existing vehicles using legacy communication protocols. CEC staff estimate the marginal hardware components needed for ISO 15118 readiness cost less than \$6 per charger.

Over the past several months, CEC staff met with several dozen automotive and electrical manufacturers, component suppliers, and other stakeholders to collect feedback on this proposal. The revisions presented in this updated document aim to provide greater clarity and flexibility to industry players as the CEC transitions its charger investments toward ISO 15118-ready equipment.

### **Phase In Process and Next Steps**

The CEC proposes to phase in the above guidelines in October 2022 for DC chargers and May 2023 for AC chargers. CEC staff are monitoring the market on an ongoing basis to track commercial availability of ISO 15118-ready hardware prior to phasing in the updated guidelines.

In June 2022, CEC staff will conduct a “temperature check” to verify whether ISO 15118-ready DC chargers from at least 5 charger brands are available on relevant CEC eligible equipment lists (for example, the CALeVIP eligible equipment list, or future equivalents). If so, beginning October 2022, all DC chargers featuring a CCS connector in subsequent CEC light-duty vehicle charger investments must be ISO 15118-ready.

In January 2023, CEC staff will conduct a “temperature check” to verify whether ISO 15118-ready AC chargers from at least 8 charger brands are available on relevant CEC eligible equipment lists. If so, beginning May 2023, all AC chargers in subsequent CEC light-duty vehicle charger investments must be ISO 15118-ready.

If a “temperature check” for a category of equipment (DC or AC) determines that there are not enough ISO 15118-ready charger brands available, CEC staff will postpone the phase in of the updated guidelines and revisit the matter in several months.

CEC staff will host a [public workshop](#) discussing these updated guidelines on November 10, 2021. The CEC is also funding expanded EVSE testing capacity and interoperability testing opportunities to aid the industry through this transition.

Until the updated guidelines take effect, chargers that are not ISO 15118-ready will continue to be eligible for CEC funding. Additionally, the CEC’s upcoming charger deployment block grants may incorporate a rebate bonus for early conformance for each ISO 15118-ready AC charger installed.<sup>1</sup> CEC staff will discuss this rebate bonus concept at the workshop and continue engagement with stakeholders to determine an appropriate rebate bonus amount, if any. The rebate bonus for ISO 15118-ready chargers would end once the updated guidelines take effect for AC chargers (for example, if the updated guidelines take effect in May 2023 for AC chargers, the rebate bonus would be discontinued at the same time).

Overall, these updated guidelines for CEC investments are intended to ensure state funds support interoperability between vehicles and charging stations, provide consumers with maximum flexibility, and help prepare for widespread and seamless vehicle-grid integration. This proposal does not require automakers or charging providers to implement specific ISO 15118 use cases. It would simply require that CEC-funded stations have this latent capability and be ready for ISO 15118, if charging providers choose to utilize it.

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<sup>1</sup> CEC is considering a bonus of approximately \$50-150 per AC charger.

## Expected Timeline

### 2021

- November 10: **CEC hosts a workshop** discussing updated hardware guidelines.
- Q4: CEC announces awards for the **Vehicle-Grid Innovation Lab (ViGIL)** solicitation and the **Electric Vehicle Interoperability Testing Symposiums (VOLTS)** RFP. ViGIL will fund expanded EVSE certification testing capacity in California, including for ISO 15118. VOLTS will fund collaborative interoperability testing events, with the first event focused on ISO 15118.

### 2022

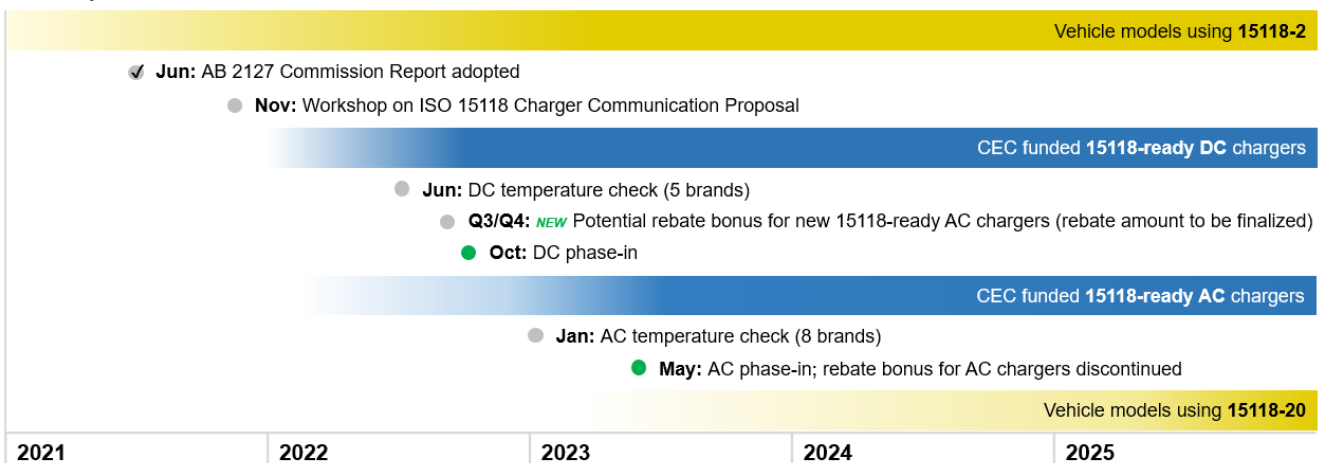
- June: **Temperature check for DC chargers:** Are ISO 15118-ready DC chargers from at least 5 charger brands commercially available and included on relevant CEC eligible equipment lists? If so, beginning October 2022, all DC chargers in subsequent CEC investments must be ISO 15118-ready. If not, delay several months and revisit at a later date. The updated hardware guideline would apply only to DC chargers featuring a CCS connector (including multiple-port chargers with at least one CCS connector), and would not apply to those using only a CHAdeMO or Tesla connector.
- Q3/Q4: CEC launches new charger funding project(s), which may include a rebate bonus for early conformance for ISO 15118-ready AC chargers.<sup>2</sup> CEC staff will work with grant administrators to track and tally ISO 15118-ready chargers eligible for the rebate bonus and in preparation for “temperature checks” in 2022 (DC) and 2023 (AC).
- TBD: ViGIL may begin offering expanded EVSE testing services in 2022. Additionally, the first VOLTS testing event may occur in 2022.

### 2023

- January: **Temperature check for AC chargers:** Are ISO 15118-ready AC chargers from at least 8 charger brands commercially available and included on relevant CEC eligible equipment lists? If so, beginning May 2023, all AC chargers in subsequent CEC investments must be ISO 15118-ready. If not, delay several months and revisit at a later date.

The above timeline is summarized in the figure below.

**CEC Expected ISO 15118 Transition Timeline**



<sup>2</sup> CEC is considering a bonus of approximately \$50-150 per AC charger.

## Questions & Answers

**What is changing?** CEC-funded light-duty vehicle chargers must be ISO 15118-ready beginning October 2022 for DC chargers and May 2023 for AC chargers. CEC staff will conduct a “temperature check” to ensure sufficient commercial availability of ISO 15118-ready hardware prior to phasing in the updated hardware guidelines. For DC chargers, the updated hardware guideline would apply to DC chargers featuring a CCS connector (including multiple-port chargers with at least one CCS connector), and would not apply to those using only a CHAdeMO or Tesla connector.

**What is an “ISO 15118-ready” charger?** An ISO 15118-ready charger is capable of powerline communication as outlined in ISO 15118-3, secure management and storage of keys and certificates, TLS version 1.2 (additional support for TLS 1.3 or subsequent versions is recommended), and connecting to a backend network. Charging providers will be responsible for completing a self-attestation that their hardware supports these capabilities. CEC recommends that manufacturers self-test for ISO 15118-3 conformance using tests defined in ISO 15118-5. ISO 15118-ready chargers must be capable of remotely receiving updates to activate or enable ISO 15118 use cases. ISO 15118-ready chargers must be capable of selecting the appropriate communication protocol used by the vehicle.

**Do these hardware guidelines apply to all chargers in the state?** These updated hardware guidelines apply only to future CEC-funded light-duty vehicle chargers. Independently purchased charging equipment is unaffected by these guidelines.

**Will CEC continue to fund chargers that are not ISO 15118-ready during the phase in period?** Yes. CEC will continue to fund charging infrastructure, including for equipment that is not ISO 15118-ready, until the updated guidelines take effect.

**What if I install ISO 15118-ready chargers before the new guidelines are phased in?** The CEC’s upcoming charger deployment block grants may launch with a rebate bonus for early conformance for each ISO 15118-ready AC charger installed.<sup>3</sup> The rebate bonus will end when the updated guidelines take effect for AC chargers (for example, if the updated guidelines take effect in May 2023, the rebate bonus for AC chargers would be discontinued at the same time).

**Which ISO 15118 use cases is the CEC requiring?** This proposal does not require implementation of any ISO 15118 use cases. This proposal is intended to ensure that CEC-funded chargers are reasonably futureproof and physically capable of supporting upcoming charging features which rely on ISO 15118. For example, ISO 15118-ready chargers should be capable of Plug and Charge and energy management, but these guidelines do not require automakers or charging providers to implement these use cases. CEC staff recognize that use case implementation depends on further collaboration between automakers, charging providers, suppliers of ISO 15118-3 compliant hardware, and conformance testing laboratories. ISO 15118-ready chargers must be capable of receiving updates to activate or enable ISO 15118 use cases.

**How will the CEC verify that a charger actually meets the definition of ISO 15118-ready?** The CEC recommends that charger manufacturers self-test for ISO 15118-3 conformance using ISO 15118-5, which describes physical layer and data link layer conformance tests to implement PLC-based high-level communication. When qualifying equipment onto relevant CEC eligible equipment lists (for example, the CALeVIP eligible equipment list, or future equivalents), the CEC will require charging providers to attest

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<sup>3</sup> CEC is considering a bonus of approximately \$50-150 per AC charger.

whether a charger model is ISO 15118-ready as defined by these guidelines. The CEC may consider other verification means in the future as ISO 15118 compliance and testing services become more widely available.

**Will ISO 15118-ready chargers work with older vehicles?** Yes. ISO 15118-ready chargers must be capable of selecting the appropriate communication protocol used by the vehicle. AC chargers must continue supporting pulse-width modulation control using IEC 61851 and may support multiple versions of ISO 15118 (-2 and -20). DC chargers must continue supporting DIN 70121 and may support multiple versions of ISO 15118 (-2 and -20).

**Which electric vehicles plan to implement ISO 15118?** The CEC documented a non-exhaustive list of light-duty electric vehicle manufacturers with plans to implement ISO 15118 in Chapter 5 of the [AB 2127 Electric Vehicle Charging Infrastructure Assessment](#).

**Is there sufficient supply of transceiver hardware to support the deployment of ISO 15118-ready chargers?** CEC has identified four manufacturers of HomePlug Green PHY transceivers used to implement PLC-based high-level communication, including Qualcomm, ST Microelectronics, Lumissil, and Vertexcom. Suppliers have stated that with time to communicate hardware design, integration, and supply plans with manufacturers, it is feasible to supply HomePlug Green PHY transceivers at a level consistent with the infrastructure trajectories described in the AB 2127 report. In addition, one charging provider has stated that it is possible to enable high-level communication for ISO 15118 without a HomePlug Green PHY transceiver.

**What about other communication pathways, such as telematics?** These updated hardware guidelines focus on hardware-readiness for ISO 15118 in future CEC charger investments, and do not affect or preclude the use of other pathways for charging communication. CEC staff expect that some automakers will use ISO 15118 in concert with their vehicle telematics systems.

**What about CHAdeMO and Tesla connectors?** For DC chargers, the hardware guidelines would apply to DC chargers featuring a CCS connector (including multiple-port chargers with at least one CCS connector), and would not apply to those using only a CHAdeMO or Tesla connector. The CEC will monitor the market and ensure that charging stations provide appropriate levels of support for vehicles that do not use CCS.