California Energy Commission

Clean Transportation Program

FINAL PROJECT REPORT

EVSE Field Standards

Prepared for: California Energy Commission

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PREFACE

Assembly Bill 118 (Núñez, Chapter 750, Statutes of 2007) created the Clean Transportation Program. The statute authorizes the California Energy Commission (CEC) to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change policies. Assembly Bill 8 (Perea, Chapter 401, Statutes of 2013) reauthorizes the Clean Transportation Program through January 1, 2024, and specifies that the CEC allocate up to $20 million per year (or up to 20 percent of each fiscal year's funds) in funding for hydrogen station development until at least 100 stations are operational.

The Clean Transportation Program has an annual budget of about $100 million and provides financial support for projects that:

- Reduce California's use and dependence on petroleum transportation fuels and increase the use of alternative and renewable fuels and advanced vehicle technologies.
- Produce sustainable alternative and renewable low-carbon fuels in California.
- Expand alternative fueling infrastructure and fueling stations.
- Improve the efficiency, performance and market viability of alternative light-, medium-, and heavy-duty vehicle technologies.
- Expand the alternative fueling infrastructure available to existing fleets, public transit, and transportation corridors.
- Establish workforce-training programs and conduct public outreach on the benefits of alternative transportation fuels and vehicle technologies.

To be eligible for funding under the Clean Transportation Program, a project must be consistent with the CEC's annual Clean Transportation Program Investment Plan Update. The CEC issued contract 600-23-005 to procure at least 15 field standards for evaluating and verifying commercial measuring devices dispensing electricity as a zero-emission transportation fuel. Nine (9) of these field standards will use AC power and six (6) will use DC power. This will provide the resources needed to reduce and eventually eliminate the testing backlog of newly installed ZEV fueling systems that require weights and measures official inspection to be sealed and approved for commercial use.

In response to discussions with the CEC, industry stakeholders, and county officials it was determined that the lack of available field standards and uncertainty in the commercial device requirements for installed EVSE was delaying installation and activation of devices in many jurisdictions. In consultation with CEC, a funding opportunity was identified that could help mitigate these marketplace challenges. The recipient submitted an application which was proposed for funding by the CEC and approved. The interagency funding agreement was executed as 600-23-005 on 1/14/2025.

ABSTRACT

The successful commercialization of electricity as a zero-emission transportation fuel in California requires the rapid deployment of a state-wide network of commercial electric vehicle fueling systems (EVFS) capable of reliably and accurately fueling (charging) battery electric and hybrid electric vehicles. Successful commercialization and consumer acceptance of zero emission vehicles (ZEVs) depend on hydrogen and electricity as reliable vehicle fuels. Standardized fueling infrastructure is essential to providing the consumer with a basis-of-value comparison and providing marketplace transparency and fair competition for industry.

California weights and measures laws and regulations establish standards to minimize measurement errors in commercial transactions and provide operating requirements that are consistently applied in the exchange of goods and services. Adherence to these standards provides both buyers and sellers an assurance of equity and confidence.

Prior to full scale commercialization, devices used in commercial transactions must undergo type evaluation testing to assure that the measuring device is accurate; repeatable; designed to operate in the conditions it will be exposed to; cannot be used to defraud customers, and a fair and accurate accounting of all measurements and charges is communicated to the customer. Type evaluation determines whether a device design conforms to the specifications, tolerances, and user requirements as adopted by the Department of Food and Agriculture pursuant to authority granted the Secretary in Business and Professions Code (BPC) 12107. As of January 1, 2023, only type approved EVFS are authorized to be sold, installed, and placed in service for commercial purposes in California.

The responsibility to inspect and verify conformance to established commercial device requirements for EVFS is born by the local County Sealer of Weights and Measures, who, with the support of technical training and oversight provided by the Division of Measurement Standards, ensures that all commercial devices installed in their jurisdiction are correct.

The purpose of routine field testing is to ensure installed devices conform to all applicable standards and to minimize the measurement error in commercial transactions. There exists a significant and growing gap between the on-going and planned commercial ZEV fueling systems installations and available test equipment (field standards) needed by county officials to inspect, test, and seal new devices being installed in their respective jurisdiction.

The provisions of Division 5 of the California Business and Professions Code (sections 12001 et seq.) and Title 4, Division 9, of the California Code and Regulations (sections 4000 et seq.), provide the legal authority for the California Department of Food and Agriculture's (CDFA) Division of Measurement Standards (DMS) to apply basic weights and measures requirements to all commercial devices used to dispense electricity for fueling ZEVs.

CDFA is required by law to regulate weighing and measuring devices used in commerce. Business and Professions Code, section 12107, requires CDFA to establish specifications and tolerances for all commercial weighing and measuring devices. This includes motor vehicle fuel dispensing systems. Once these parameters are established, it is incumbent upon weights and measures officials to test, verify, and seal commercial devices.

The California Agricultural Commissioners and Sealers Association (CACASA) EVSE subcommittee found that a majority of counties do not have the necessary field standards and

are reluctant to procure them at current cost levels. DMS currently has five field standards for electric vehicle supply equipment (EVSE) and only two that are available to share with the counties for field testing, verification, and sealing of installed commercial ZEV fueling systems. All the existing field standards have the ability to test AC and DC chargers up to 200A. With the current number of field standards, an average of 150 EVSE can be tested in the working day. However, this does not consider travel time to various EVSE or to the EVSE located in separate counties. As the number of EVSE installed across the state continues to grow into the tens of thousands of commercial installations, increasing the number of field standards in circulation is vital to address a growing bottleneck in the verification and activation of newly installed EVSE.

On the state support level, DMS only had five field standards for EVFS to support the counties for field testing, verification and sealing of installed commercial EVFS. Two of DMS' EVFS standards are dedicated to type-evaluation of new commercial EVFS designs. As the backlog for system testing and verification grows, the push for transportation electrification is accelerating and the essential support systems that will keep the growing EV market viable need to be in place to support an equitable and consistent marketplace that fosters the continued adoption of zero emission vehicle technology. The acquisition of fifteen new field standards and associated test equipment will provide much needed support to county officials and improve responsiveness of counties to test and seal EVFS installed in their jurisdictions while they make efforts to add test equipment of their own as demand and funding dictate.

Keywords: Electric Vehicles (EVs), Electric Vehicle Fueling System (EVFS), Electric Vehicle Supply Equipment (EVSE), Field Standard, Division of Measurement Standards (DMS), California Type Evaluation Program (CTEP), Registered Service Agency (RSA), Licensed Service Agent, Commercial EVSE Device Requirements, National Institute of Standards and Technology (NIST), Handbook 44 (HB 44), Examination Procedures Outline (EPO), County Weights and Measures Official, Sealing, California Agricultural Commissioner and Sealers Association (CACASA), California Department of Food and Agriculture (CDFA), Field Reference Manual,

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EXECUTIVE SUMMARY

Background

Assembly Bill (AB) 118 (Núñez, Chapter 750, Statutes of 2007), created the Clean Transportation Program. The statute authorizes the California Energy Commission (CEC) to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change policies. AB 126 (Reyes, Chapter 319, Statutes of 2023) re-authorizes the Clean Transportation Program through July 1, 2035. The Clean Transportation Program has an annual budget of approximately $100 million and provides financial support for projects that:

- Develop and deploy zero-emission technology and fuels in the marketplace where feasible and near-zero-emission technology and fuels elsewhere.
- Produce alternative and renewable low-carbon fuels in California.
- Deploy zero-emission fuel infrastructure, fueling stations, and equipment where feasible and near-zero-emission fuel infrastructure, fueling stations, and equipment elsewhere.
- Establish workforce training programs and conduct public outreach on the benefits of alternative transportation fuels and vehicle technologies.

California leads the nation in its long-term transportation strategy to reduce pollution and greenhouse gas emissions by adopting alternative fuel vehicles and zero-emission technologies. Widespread public adoption of battery electric vehicles and fuel cell electric vehicles are intended to be a major component of the transition to ZEVs. Accordingly, an aggressive expansion of a commercial fueling infrastructure is needed to meet the state's goals for adoption of zero emission vehicle types across all on-highway ZEV platforms.

The California Department of Food and Agriculture (CDFA) is mandated by the California Business and Professions Code (BPC) Division 5, Chapter 2, § 12107 to adopt requirements for commercial weighing and measuring devices used in California. An electric charging station, when used to transfer electricity to a vehicle for a fee, becomes a commercial measuring device. BPC § 12500.5 requires that weighing and measuring devices be approved by CDFA before they may legally be used for commercial sales. The responsibility for evaluating and approving weighing and measuring devices is assigned to CDFA's Division of Measurement Standards (DMS). Commercial weighing and measuring devices are approved by DMS through a process known as "type evaluation." AB 631 (Ma, Statutes of 2011, Chapter 480) amended Public Utilities Code § 216(i) to clarify that the ownership, control, operation, or management of a facility that supplies electricity to the public only for use to charge light-duty plug-in electric vehicles, as defined, does not make the corporation or person a public utility. Therefore, it is the responsibility of CDFA to establish and support county enforce the legal requirements for commercial devices used in the sale of electricity to fuel ZEVs. Once these parameters are established, it is incumbent upon weights and measures officials to test, verify, and seal commercial ZEV fueling equipment.

The primary responsibility to inspect and verify conformance to established commercial device requirements for ZEV fueling systems is born by the local County Sealer of Weights and Measures, who, with the support of technical training and oversight provided by the Division of Measurement Standards, ensure that all commercial devices installed in their jurisdiction conform to all applicable standards and to minimize the measurement error in commercial transactions.

There exists a significant and growing gap between the on-going and planned commercial ZEV fueling systems installations throughout the state and the access to test equipment (field standards) needed by county officials to inspect, test, and seal new devices being installed in their respective jurisdictions.

Actions

The execution of interagency agreement #600-23-005 between CEC and CDFA DMS was a vital step in helping to bridge the widening gap between testing requirements and equipment availability for new installations of commercial ZEV fueling infrastructure. DMS staff began researching existing and available electrical measurement technology and the current state of electric vehicle fueling system (EVFS) designs to identify the best available equipment that can be purchased to address the backlog of device testing needed to be completed by county officials.

This report details the successful completion of the Scope of Work identified in agreement 600-23-005. With the support of the CEC and the efforts of CDFA DMS and all the state county officials, California will continue to lead the nation in its long-term transportation strategy to reduce pollution and greenhouse gas emissions by adopting zero-emission technologies. Additionally, an open, transparent, and competitive marketplace for commercial fueling of ZEVs will be a foundational pillar supporting the state's goals for widespread adoption of both battery electric and plug-in hybrid electric vehicles going forward.

CHAPTER 1: Project Purpose, Goals, and Objectives

The purpose of this agreement was to alleviate current EVSE installation and activation constraints by adding available equipment to test and seal commercial EVSE, add modern information resources to support industry and regulators, and improve communication channels between manufacturers of EVSE, Registered Service Agencies, owner/operators of commercial EVSE, and state and county weights and measures officials.

Goals:

The goal of this Agreement was to procure at least 15 field standards for evaluating and verifying commercial measuring devices dispensing electricity as a zero-emission transportation fuel. This will provide the resources needed to reduce and eventually eliminate the testing backlog of newly installed ZEV fueling systems that require weights and measures official inspection to be sealed and approved for commercial use.

Objectives:

- Contact key vendors and obtain bids for field standards to test and verify commercial EVSE. The agreement shall follow any and all guidelines for competitive bid processes outlined in GIA- 11/2022 and the State Contracting Manual, Section 3.06.
- Procure at least fifteen (15) certified field standards for testing and verifying energy measurement of commercial EVSE. Of the fifteen, nine (9) of these certified field standards should use AC power and six (6) should use DC power.
- Review and refine established field test procedures for EVSE and associated equipment.
- To support accessibility and efficacy of the procured equipment, update the CDFA DMS website to include clear educational and informational content and resources for entities installing EV charging stations, Registered Service Agents, and those whom would like to become certified as a Registered Service Agent or Registered Service Agency.
- Deploy field standards to test and verify newly installed commercial ZEV fueling devices to ensure accuracy and compliance with applicable laws, ordinances, regulations, and standards.

Team Introduction

California Department of Food and Agriculture (CDFA), Division of Measurement Standards (DMS):

California Department of Food and Agriculture is required by law to regulate weighing and measuring devices used in commerce. Business and Professions Code, section 12107, requires CDFA to establish specifications and tolerances for all commercial weighing and measuring devices. This includes motor vehicle fuel dispensing systems. The responsibility for evaluating and approving weighing and measuring devices is assigned to CDFA's Division of Measurement Standards (DMS). Commercial weighing and measuring devices are approved by DMS through a process known as "type evaluation." Once these parameters are established, it is incumbent upon weights and measures officials to test, verify, and seal commercial devices. CDFA-DMS is

also required to provide training and guidance to county weights and measures officials on the procedures for testing and inspecting EVSE installed for commercial purposes. CDFA-DMS also registers Service Agencies and licenses service agents, who repair, install, calibrate, and place in service EVSE. As the contract recipient, CDFA-DMS prepared the technical and performance requirements of the field standards that were included in the Request for Proposal; reviewed and approved, in consultation with the Department of General Services, the successful bidder for the procurement of field standards; prepared and posted updates to the DMS webpages and resources to better inform stakeholders; and began hosting EVSE Info Hours online to provide direction to stakeholders with questions and concerns about commercial EVSE legal requirements.

Key Personnel:

- Kevin Schnepp, Director – Kevin served as the project manager and lead for this agreement and the author of this report.
- Tony Gruneisen, Principal State Metrologist - Tony managed the receipt and documentation of field standards and associated equipment as it arrived from the vendor. He established a tracking database for all EVSE field standards and assigned inventory ID numbers for EVSE field standards.
- Matthew Douglas, Supervising Special Investigator – Matt provided technical guidance and direction to the updates for the Examination Procedure Outline (EPO) used by officials for testing and inspecting installed EVSE. He serves as technical advisor during the EVSE Info Hour meetings with stakeholders.
- Rebecca Akers, Staff Services Manager- Rebecca managed invoices, billing, and provided contract support to meet scheduling and reporting due dates.
- Jeremy Epley, Supervising Special Investigator – Jeremy provided technical guidance and direction to the updates for the Examination Procedure Outline (EPO) used by officials for testing and inspecting installed EVSE. He serves as technical advisor during the EVSE Info Hour meetings with stakeholders. He provided training to county officials on the testing and inspection of EVSE.
- Anil Samuj, Special Investigator – Anil established the storage, identifying, and tracking system to monitor the inventory of test equipment and coordinate loaning of equipment to county officials.
- Jack Witt, Environmental Scientist – Jack served as the subject matter expert regarding the specifications and tolerances applicable to commercial EVSE. He is a technical advisor to industry for type evaluation and lead evaluator for type testing commercial EVSE. Jack also serves as technical advisor during the DMS EVSE Info Hour meetings with stakeholders.

CHAPTER 2: Verification of Installed ZEV Infrastructure

Support for local county weights and measures officials' routine inspection and testing of commercial EVFS.

CDFA DMS staff work was focused on identifying available and appropriate field standards that could safely, accurately, and reliably test and verify the conformance of commercial EVFS to adopted specifications, tolerances, and user requirements. Upon the completion of our research and assessment of performance parameters of field ready and available EVSE field standards capable of testing both AC and DC commercial EVSE to California requirements, CDFA DMS worked with their Contracts Office and the Department of General Services (DGS) to prepare and post a Request for Quote (RFQ) to identify potential vendors capable of providing the required equipment. After two successive postings of an RFQ, a qualified vendor was selected and a purchase order for fifteen (15) field standards along with associated equipment such as transport carts, load emulators, and "man-in-the-middle" cables needed for testing EVFS was submitted. The selected vendor, Tesco, was awarded the procurement contract and purchase order from DGS. Several delays in the execution and completion of the award to the selected vendor resulted in total costs for all identified equipment in this agreement exceeding the allotted funds. CDFA-DMS agreed to cover the additional costs rather than fail to meet the number and type of field standards identified in this agreement.

The procurement of the EVFS field standards progressed at a slightly delayed pace due to several unforeseen factors. First the dollar amount for equipment purchase exceeded the Department's designated purchase authority. The RFQ and purchase request was then forwarded to the procurement program team with DGS to comply with state procurement requirements. The purchase request and associated specifications were reviewed over a period of months and eventually approved by DGS in May of 2025. Next, the CDFA contracts office had to prepare an RFQ to solicit bids according to DGS open bidding, contracting and procurement requirements. The initial RFQ was posted on July 01,2025 and, upon review of bids after closing date of July 30, 2025, no qualified bid was received, and two bids were considered unresponsive due to missing information. CDFA-DMS prepared an updated RFQ with additional details to encourage proper and complete bids were received from vendors capable of fulfilling the technical and operational requirements for fifteen (15) EVFS field standards and associated equipment needed to fulfill the scope of work identified in this agreement. A second RFQ was prepared and submitted to DGS for review and approval. The second DGS approved RFQ was posted on September 05, 2025 and closed on September 19, 2025. Responsive bids were reviewed by DGS and CDFA Contracts Office along with DMS staff and one qualified bid was identified. The selected vendor, Tesco, was awarded the procurement contract and purchase order from DGS.

CDFA DMS has acquired all fifteen (15) field standards and most of the associated test equipment to support county efforts to test and evaluate commercial EVFS installed in the state. The outstanding equipment on back-order is in excess to the funds provided by this agreement and will be paid for with CDFA funds set aside to meet desired equipment levels. With deployment of this equipment resource to county officials and upon successful testing and sealing by county officials, commercial EVFS will be authorized to legally fuel (charge)

battery electric vehicles. A major barrier for commercial EVFS installation, deployment, and use will be reduced. DMS has conducted training of over 100 county weights and measures officials on EVFS testing and evaluation procedures. CDFA DMS has also loaned out EVFS field standards to three (3) counties that have received the required training and requested use of the equipment. Additional counties throughout the state have requested training and are being scheduled to receive training by DMS staff.

Figure 1: EVSE Field Standard

Example of Field standard and load emulator used for testing installed commercial EVFS

Source: CDFA DMS Photo

Figure 2: High Power Load Emulator

Example of high-power load emulator used for testing installed commercial EVFS

Source: CDFA DMS Photo

Figure 3: Interconnect Cable for Using and EV

Example of Man-in-the-Middle cable used with field standards when an electric vehicle is used as the load for testing installed commercial EVSE. CCS-1 Connector Illustrated.

Source: CDFA DMS Photo

Figure 4: Utility Cart and Shelf for EVSE Field Standard

Example of utility cart and shelf used for transporting and setting up field standard test equipment.

Source: CDFA DMS Photo

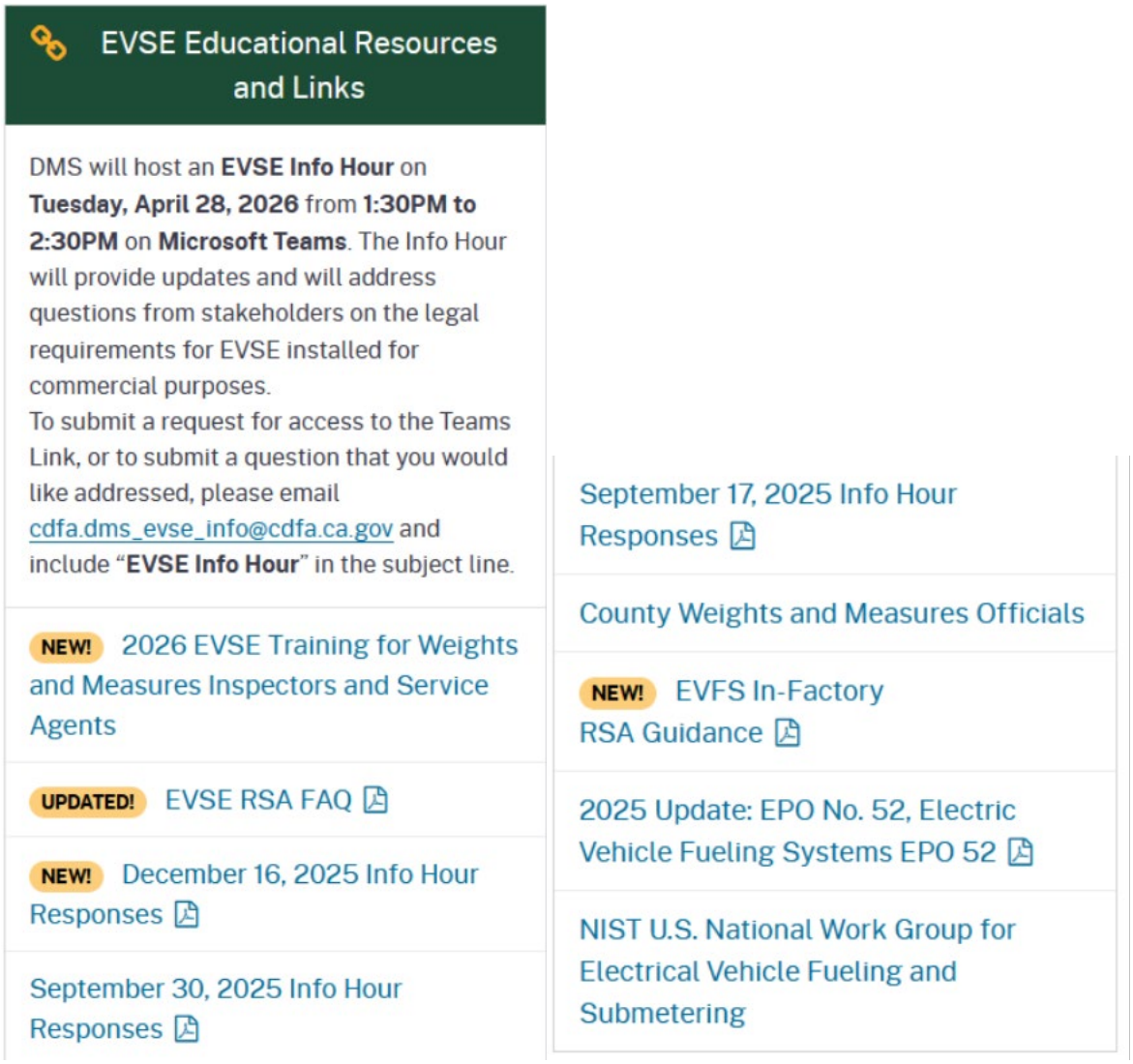
CHAPTER 3: Modernization of CDFA –DMS Web Resources

CDFA DMS has updated and revised its field inspection document Examination Procedures Outline (EPO) 52 to better instruct field officials on the proper procedure for testing installed commercial EVFS. Field testing data received from the operation and use of the newly acquired field standards will be used to support refinements and updates to the National Institute of Standards and Technology (NIST) Examination Procedure Outline for EVSE (EPO 30) to promote national uniformity in the testing of commercial EVFS. National uniformity is a key metric for manufactures of EVFS, Vehicle OEMS, and owner operators of battery electric vehicles to support wide-spread adoption.

An EVSE Educational Resources block has been added to DMS RSA and ZEV Projects webpages to provide ease of access to EVSE specific informational and guidance documents. The online frequently asked questions (FAQ) on DMS' Registered Service Agency and Zero-Emission Vehicle Projects webpages have been updated to remain current with technology being deployed in the field and to include application and implementation guidance on the weights and measures requirements for installed commercial EVSE. A guidance document developed in consultation with several EVSE manufacturers for in-factory RSA testing of commercial EVSE prior to installation and activation has been posted. The required resource document for Registered Service Agencies and their agents, the DMS Field Reference Manual, has been updated to an online format and all embedded links connect to current laws and regulations to maintain currency whenever referenced by service persons installing or repairing and placing in service commercial EVSE.

Beginning in September of 2025, DMS began hosting online EVSE info hours to address questions and concerns from stakeholders across the commercial EVSE universe. These info hours address specific questions from manufacturers of EVSE, RSAs installing and placing commercial EVSE in service, device/owner operators, county officials, and service providers who operate back-end billing and management services for EVSE. During each info hour, as time allows additional questions from the attendees are accepted and discussed in a town-hall type question and answer session. The questions and answers from these info hours are then later added to DMS webpages. Each info hour is announced in advance on DMS' website and a link to each info hour session is emailed to stakeholders who have requested notification and/or have attended a prior info hour.

Figure 5: CDFA-DMS Webpage EVSE Resources



Example of EVSE Educational Resources Block. Hosted at https://www.cdfa.ca.gov/dms/programs/rsa/rsa.html and https://www.cdfa.ca.gov/dms/programs/zevfuels/

Source: CDFA DMS Image

CHAPTER 4: Summary of Training and Loan Framework

County weights and measures officials who have received hands-on training from CDFA-DMS are eligible to borrow and use the field standards and associated accessory equipment to support their inspections and sealing of commercial EVSE installed in their jurisdiction.

The hands-on training is scheduled in coordination with CDFA-DMS' Devices Program staff who deliver training that includes procedural and safety practices, equipment troubleshooting, and active use of the field standards and accessories. Each trainee is required to demonstrate proficiency in the use of the equipment prior to being authorized to borrow and use the equipment in the field. County staff are directed to their regional Device Program representative to request training on the care and use of the EVSE field standards and associated accessory equipment.

DMS staff maintain a database of county officials who have been trained and authorized on the use of the field standards. Equipment is loaned via a check-out procedure to ensure accurate accounting of the location and duration of the equipment on loan. Counties are responsible for maintaining the security and safety of DMS equipment in their possession and an established check-out and check-in process documents the equipment type, quantity, and condition upon receipt by the county and upon return to DMS. Equipment loan durations are based upon availability and demand. Typical loan periods are for two-week intervals with some smaller jurisdictions only needing one week while some larger jurisdictions may request to borrow more than one standard at a time when available. DMS device staff are available during normal business hours to provide technical support during the equipment loan period.

Counties that have been loaned equipment include Marin County Weights and Measures, Nevada County Weights and Measures, Shasta County Weights and Measures, Sacramento County Weights and Measures, Fresno County Weights and Measures, San Joaquin County Weights and Measures, Orange County Weights and Measures, and Imperial County Weights and Measures.

CHAPTER 5: Field Standards Status, Acquisition, and Deployment Report

The desired acquisition of fifteen (15) field standards with measurement traceability has been successfully completed. The acquisition of equipment also included twelve (12) load emulators for simulating an electric vehicle and providing test points determined by the operator in accordance with Examination Procedure Outline for EVSE- EPO-52 along with three high power DC load emulators to support higher output DC fast charger field testing. As of this report writing, two of the AC load emulators are on back order. For testing installed commercial DC powered EVSE with an electric vehicle as the load, fifteen (15) man-in-the-middle cables – nine with NACS connectors and six with CCS-1 connectors have also been acquired. DMS now has a total of twenty field standards with eighteen of the twenty state-owned standards available for loan to county weights and measures officials along with accessories for AC and DC load emulation and cables for using an electric vehicle as the load for testing and sealing of installed commercial EVSE. The procurement delays resulted in higher net overall costs for the equipment than covered by this agreement. CDFA-DMS agreed to cover the additional costs to assure that the desired equipment totals could be met.

The acquisition process experienced multiple delays as identified in this report. These delays resulted in the final acquisition of all equipment being completed in March of 2026. The housing and storage of equipment is spread between DMS' Sacramento and Anaheim offices. To date, March 10, 2026, four counties who have received training are currently using the newly acquired equipment to test installed commercial EVSE in their jurisdiction. DMS has received requests from nine additional counties to borrow EVSE field standards and associated equipment. Due to the higher cost and size of the high-power DC load emulators, a memorandum of understanding (MOU) is being drafted to ensure counties who borrow these units can accept financial responsibility for any damage or loss when such equipment is in their possession. DMS device staff will coordinate scheduled inspections to assist county officials requesting use of the high-power DC load emulators until an MOU is executed.

At the inquiry and request of several county officials, the MOU will also include details for EVSE field standards and equipment loan periods of longer duration as well as parameters for borrowing more than one set of equipment. The MOU discussions are ongoing and expected to be finalized by April 30, 2026. While the MOU language is being developed, the established two-week loan period and one EVSE field standard with accessories per county will serve as the normal equipment loan process. With agreement, amendments on situational basis can be achieved until the MOU is formalized. This approach assures counties with EVSE test equipment support needs can utilize the acquired equipment in a manner that best meets the demand and availability of state-owned equipment.

CHAPTER 6: Project Outcomes and Achievements

Field Standard Equipment Acquired:

- Fifteen (15) field standards with traceable AC and DC electrical energy measurement have been delivered to CDFA-DMS.
- The field standards acquired were manufactured by TESCO and are identified by model number T-4350.
- CDFA-DMS also acquired essential test standard accessories also provided by TESCO for testing installed commercial EVSE including:
- Nine (9) man-in-the-middle cables with NACS connectors for testing EVSE operating with NACS configurations. Used in place of a load emulator when using an electric vehicle as the load for testing installed EVSE.
- Six (6) Man-in-the-middle cables with CCS-1 connectors for testing EVSE operating with CCS-1 configurations. Used in place of a load emulator when using an electric vehicle as the load for testing installed EVSE.
- Twelve (12) AC load emulators. Used to simulate a vehicle and provide operator with the ability to establish specific test points. Ten (10) have been delivered with two (2) on back order.
- Three (3) High power DC Load Emulator. Used to simulate a vehicle and provide operator with the ability to establish specific test points. Capable of testing DC energy levels up to 1000 volts and 500 amps.
- Fourteen (14) Utility Carts and test stands for loading and transporting test equipment to/from vehicles and supporting test equipment during testing with one cart on back order.
- Fifteen (15) shade umbrellas for protecting equipment and operators from heat and rain.

Educational and Informational Resources

The acquisition of essential equipment to support field testing verification and sealing of commercial EVSE was one component of this agreement. Additional educational and communication resources were also established to provide clear consistent messaging and understanding of the various technical and regulatory requirements for installing commercial EVSE. DMS developed, refined, and/or added the following educational and informational resources to better support stakeholders engaged in manufacturing, installing, repairing, owning/operating, and regulatory oversight of commercial EVSE infrastructure in California:

- Updated and posted the examination procedures outline (EPO-52) for inspecting and testing installed commercial EVSE.
- Added an EVSE Educational Resources block to both the Registered Service Agency and Zero-Emission Vehicles Project webpages hosted on DMS' website.

- Updated and posted the revised frequently asked questions (FAQ) documents for both RSAs and EVSE manufacturers.
- Developed and posted a guidance document for in-factory RSA testing of commercial EVSE prior to installation and activation.
- Began hosting an EVSE Info Hour on-line meeting to address specific stakeholder questions on the application of regulatory requirements, interpretation of DMS notices and industry guidance, and the utilization of test equipment and standards, for commercial EVSE infrastructure. An EVSE Info Hour is planned for each month to maintain outreach and communication on a regular basis and provide timely updates to address technological updates or changes.
- Posting of questions and answers from each info hour in the EVSE educational resources block on DMS webpages.

CHAPTER 7: Finding and Lessons Learned

Delays in the procurement process can result in increased costs from vendors due equipment revisions such as upgrades and model changes. The procurement process experienced several delays and negatively impacted on the timeline for acquisition of EVSE field standards detailed in this agreement. In addition to processing delays between CDFA's contract unit and DGS, the first RFP resulted in no successful bidder being selected with a few bidders deemed by DGS to be unresponsive due to technical or communication omissions. A second RFP along with a more detailed specifications and deliverables document was needed in order to obtain a qualified bidder. Upon receipt of a qualified bid the costs, models, and specifications of some of the equipment identified in the SOW had changed. The model and specifications changes resulted in better qualified equipment overall, but also included increased unit costs.

Maintaining currency of information on available equipment to fulfill the technical requirements will help keep programs up to date and enable timely adjustments to SOW and related terms as needed. This is a difficult task, however, as it is unknown which vendor(s) may be awarded a purchase contract after the RFP process.

A successful vendor may have production and delivery timelines that also impact on the timely acquisition of equipment after being awarded a purchase contract. Building additional time into agreements of this type should be considered to allow for the process of selecting and awarding a vendor and for the vendor to produce, ship, and deliver on all requirements included in the award.

The equipment delivered will meet the needs of DMS and the county weights and measures officials to effectively inspect, seal, and place in service installed commercial EVSE. Requests for training and receiving EVSE test equipment on loan from DMS have already begun with 3 counties utilizing the newly acquired DMS equipment to complete inspections and sealing of EVSE installed in their jurisdiction.

The addition of the EVSE info hour continues to be very well attended with 85-109 participants across all stakeholder groups participating in these events. This added information source has been valuable to DMS and allows staff to address current technical issues and areas of regulatory interpretation while providing clear messaging to all participants. Of equal value has been the updating of guidance documents and materials and the creation of an EVSE Educational Resources Block within both the RSA and ZEV projects pages hosted on DMS' website. These web resources provide easy access to EVSE specific resources to better support all stakeholders engaged in EVSE infrastructure deployment, operation, and oversight.

Chapter 8: Conclusion

The efforts to provide additional resources of equipment, training, and education to support commercial EVSE infrastructure deployment in California through this agreement have proven successful. While some desired metrics entailed more time and effort to achieve, the desired outcomes are being realized. With the acquisition of fifteen (15) field standards with measurement traceability along with associated test equipment and accessories, state and county weights and measures officials are now able to match multiple test configurations with the acquired equipment to inspect and seal the variety of installed commercial EVSE in the state.

The updates to web-based resource documents for EVSE manufacturers, service agencies, and owner operators have provided a convenient and easily locatable source to address questions, concerns, and compliance requirements for these stakeholders. The addition of a regular on-line meeting question and discussion forum in the form of an EVSE Info Hour hosted by CDFA-DMS has been very well received and well attended by stakeholders across the spectrum of EVSE manufacturing, installation, activation, owner/operating, and regulatory oversight interested parties.

The collaboration and discussions with EVSE manufacturers led to the release of a guidance document to allow manufacturers of EVSE to initiate in-factory testing of commercial EVSE prior to installation thereby allowing for more efficient installation and placing in service of commercial EVSE.

The continued expansion of commercial EVSE infrastructure will maintain pressure on weights and measures officials, registered service agencies, EVSE manufacturers, and owner/operators of EVSE to maintain a robust a compliant marketplace. With the successful completion of the Scope of Work identified in agreement 600-23-005, California county sealers will have access to needed equipment to support their work of testing and sealing installed commercial EVSE throughout the state. This is especially significant for many of California's more rural counties where resources to procure specialized equipment are frequently limited.

With the support of the CEC and the efforts of CDFA DMS and all the state county officials, California will continue to lead the nation in its long-term transportation strategy to reduce pollution and greenhouse gas emissions by adopting zero-emission technologies. Additionally, an open, transparent, and competitive marketplace for commercial fueling of ZEVs will be a foundational pillar supporting the state's goals for widespread adoption of both battery electric and plug-in hybrid electric vehicles going forward.

GLOSSARY

ALTERNATING CURRENT (AC) - Flow of electricity that constantly changes direction between positive and negative sides. Almost all power produced by electric utilities in the United States moves in current that shifts direction at a rate of 60 times per second.

BATTERY ELECTRIC VEHICLE (BEV) - Also known as an "All-electric" vehicle (AEV), BEVs utilize energy that is stored in rechargeable battery packs. BEVs sustain their power through the batteries and therefore must be plugged into an external electricity source in order to recharge.

BUSINESS AND PROFESSIONS CODE (BPC) - Established California laws that govern weighing and measuring devices and delineates CDFA's authority. [1]

CALIFORNIA CODE OF REGULATIONS (CCR) - The official compilation and publication of the regulations adopted, amended, or repealed by state agencies pursuant to the Administrative Procedure Act (APA). Properly adopted regulations that have been filed with the Secretary of State have the force of law. The CCR is compiled into Titles and organized into Divisions containing the regulations of state agencies.[2]

CALIFORNIA DEPARTMENT OF FOOD and AGRICULTURE (CDFA)

CALIFORNIA ENERGY COMMISSION (CEC) - The state agency established by the Warren-Alquist State Energy Resources Conservation and Development Act in 1974 (Public Resources Code, Sections 25000 et seq.) responsible for energy policy. The Energy Commission's five major areas of responsibilities are:

1. Forecasting future statewide energy needs
2. Licensing power plants sufficient to meet those needs
3. Promoting energy conservation and efficiency measures
4. Developing renewable and alternative energy resources, including providing assistance to develop clean transportation fuels

- Planning for and directing state response to energy emergencies.

CAM – Commission Agreement Manager

CTP – Clean Transportation Program

CTEP – California Type Evaluation Program

DIRECT CURRENT (DC) - A charge of electricity that flows in one direction and is the type of power that comes from a battery.

DIVISION OF MEASUREMENT STANDARDS (DMS)- A division within CDFA that maintains the state standards of measurement used for regulatory oversight of commercial weighing and

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[1] California State Legislature (http://www.legislature.ca.gov/research_and_publications/laws_and_constitution/laws_and_constitution.html)

[2] California Office of Administrative Law (https://oal.ca.gov/)

measurement devices; administers California's Type Evaluation Program, registers Service Agencies and licenses the service agents who work for them; provides training to county weights and measures officials; and establishes the legal requirements for commercial devices being sold, installed, and placed in service in California.[3]

ELECTRIC VEHICLE (EV)- A vehicle that solely uses electricity as the energy source to provide propulsion.

EVFS – Electric Vehicle Fueling System. EVSF is the term used in NIST Handbook 44 to detail the commercial device requirements for EVSE. Wherever the term EVFS is used, it should be considered synonymous with EVSE.

EVSE – Electric Vehicle Supply Equipment. Wherever the term EVSE is used, it should be considered synonymous with EVFS.

EXAMINATION PROCEDURES OUTLINE (EPO) - A standardized and sequential series of instructions used by inspectors for evaluating a commercial weighing or measuring device. [3]

FIELD STANDARD— A transportable device with certified measurement capability which is traceable to NIST or another accrediting body that can be deployed in the field to test and evaluate installed commercial weighing or measuring devices for accuracy tolerances. [3]

FTD – Fuels and Transportation Division

HANDBOOK 44—Technical document published by NIST and developed by the National Conference on Weights and Measures that serves as the national model regulations for the technical requirements of commercial weighing and measuring devices including ZEV fueling equipment.

LICENSED SERVICE AGENT – individual licensed by CDFA-DMS who performs work for or on the behalf of a Registered Service Agency.

LOAD EMULATOR—A device used in conjunction with an EVFS field standard that serves as the receptacle of the electrical energy flow from the EVFS and dissipates it as heat. Used as an alternative to a battery electric vehicle for testing EVFS.

NATIONAL COUNICIL ON WEIGHTS AND MEASURES (NCWM)—A professional association of state and local weights and measures officials, federal agencies, manufacturers, retailers, and consumers. NCWM has developed national weights and measures standards since 1905.[4]

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)—A non-regulatory agency created to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve quality of life.[5]

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[3] California Department of Food and Agriculture (https://www.cdfa.ca.gov/dms/)

[4] National Association of State Departments of Agriculture (https://www.nasda.org/organizations/national-conference-on-weights-and-measures-ncwm)

[5] USAGov (https://www.usa.gov/federal-agencies/national-institute-of-standards-and-technology)

PLUG-IN HYBRID ELECTRIC VEHICLE (PHEV) - A vehicle equipped with a battery in conjunction with an internal combustion engine that provided a limited range of travel using only electricity as the energy source to provide propulsion and then utilizes the engine with a traditional fuel to provide extended range driving.

RSA –Registered Service Agency. Organization or individual registered with CDFA-DMS to perform service work on commercial weighing and measuring devices.

SEALING – the successful testing and inspection of a commercial device to verify conformance to all applicable specifications and tolerances resulting in a weights and measures inspector affixing an approval seal (BPC 12500.5-12500.10)

TYPE EVALUATION—The process of testing and verifying that a commercial weighing or measuring device conforms to the applicable specifications and tolerances adopted for that type of device or measuring system.[3]

ZERO-EMISSION VEHICLE (ZEV) A transportation vehicle with a mode of propulsion that utilizes an energy source that produces no criteria pollutants into the environment during the vehicle's operation.

APPENDIX A: Inventory of Equipment

EVSE FIELD STANDARDS and TEST EQUIPMENT

Make	Model	SN	DMS Asset #	Cal. Due
TESCO	T4350	T4350-00075	00-71-953	11/13/2026
TESCO	T4350	T4350-00076	00-71-954	11/13/2026
TESCO	T4350	T4350-00077	00-71-955	11/17/2026
TESCO	T4350	T4350-00078	00-71-956	11/17/2026
TESCO	T4350	T4350-00079	00-71-957	11/18/2026
TESCO	T4350	T4350-00080	00-71-958	11/18/2026
TESCO	T4350	T4350-00081	00-71-959	11/25/2026
TESCO	T4350	T4350-00082	00-72-950	11/25/2026
TESCO	T4350	T4350-00083	00-72-951	11/26/2026
TESCO	T4350	T4350-00084	00-72-952	12/2/2026
TESCO	T4350	T4350-00085	00-72-953	12/2/2026
TESCO	T4350	T4350-00086	00-72-954	12/3/2026
TESCO	T4350	T4350-00087	00-72-955	12/11/2026
TESCO	T4350	T4350-00088	00-72-956	12/16/2026
TESCO	T4350	T4350-00089	00-72-957	12/15/2026
TESCO	PL4000	PL4000-000104	N/A	N/A
TESCO	PL4000	PL4000-000105	N/A	N/A
TESCO	PL4000	PL4000-000106	N/A	N/A
TESCO	PL4000	PL4000-000107	N/A	N/A
TESCO	PL4000	PL4000-000109	N/A	N/A
TESCO	PL4000	PL4000-000110	N/A	N/A
TESCO	PL4000	PL4000-000111	N/A	N/A
TESCO	PL4000	PL4000-000112	N/A	N/A
TESCO	PL4000	PL4000-000113	N/A	N/A
TESCO	PL4000	PL4000-000114	N/A	N/A
TESCO	PL4000	Back Ordered	N/A	N/A
TESCO	PL4000	Back Ordered	N/A	N/A
TESCO	PL4150	PL4150-00023	N/A	N/A
TESCO	PL4150	PL4150-00024	N/A	N/A
TESCO	PL4150	PL4150-00025	N/A	N/A
TESCO	M-I-M NACS	350-028	N/A	N/A
TESCO	M-I-M NACS	350-029	N/A	N/A
TESCO	M-I-M NACS	350-030	N/A	N/A
TESCO	M-I-M NACS	350-031	N/A	N/A
TESCO	M-I-M NACS	350-032	N/A	N/A
TESCO	M-I-M NACS	350-033	N/A	N/A
TESCO	M-I-M NACS	350-034	N/A	N/A
TESCO	M-I-M NACS	350-035	N/A	N/A
TESCO	M-I-M NACS	350-036	N/A	N/A

TESCO	M-I-M CCS1	350-0064	N/A	N/A
TESCO	M-I-M CCS1	350-0065	N/A	N/A
TESCO	M-I-M CCS1	350-0066	N/A	N/A
TESCO	M-I-M CCS1	350-0067	N/A	N/A
TESCO	M-I-M CCS1	350-0068	N/A	N/A
TESCO	M-I-M CCS1	350-0069	N/A	N/A
TESCO	Utilicart	CRT-001	N/A	N/A
TESCO	Utilicart	CRT-002	N/A	N/A
TESCO	Utilicart	CRT-003	N/A	N/A
TESCO	Utilicart	CRT-004	N/A	N/A
TESCO	Utilicart	CRT-005	N/A	N/A
TESCO	Utilicart	CRT-006	N/A	N/A
TESCO	Utilicart	CRT-007	N/A	N/A
TESCO	Utilicart	CRT-008	N/A	N/A
TESCO	Utilicart	CRT-009	N/A	N/A
TESCO	Utilicart	CRT-010	N/A	N/A
TESCO	Utilicart	CRT-011	N/A	N/A
TESCO	Utilicart	CRT-012	N/A	N/A
TESCO	Utilicart	CRT-013	N/A	N/A
TESCO	Utilicart	CRT-014	N/A	N/A
TESCO	Utilicart	Back Ordered	N/A	N/A
TESCO VENDOR	Umbrella	UMB-001	N/A	N/A
	Umbrella	UMB-002	N/A	N/A
	Umbrella	UMB-003	N/A	N/A
	Umbrella	UMB-004	N/A	N/A
	Umbrella	UMB-005	N/A	N/A
	Umbrella	UMB-006	N/A	N/A
	Umbrella	UMB-007	N/A	N/A
	Umbrella	UMB-008	N/A	N/A
	Umbrella	UMB-009	N/A	N/A
	Umbrella	UMB-010	N/A	N/A
	Umbrella	UMB-011	N/A	N/A
	Umbrella	UMB-012	N/A	N/A
	Umbrella	UMB-013	N/A	N/A
	Umbrella	UMB-014	N/A	N/A
	Umbrella	UMB-015	N/A	N/A
TESCO	Utilishelf	SLF-001	N/A	N/A
TESCO	Utilishelf	SLF-002	N/A	N/A
TESCO	Utilishelf	SLF-003	N/A	N/A
TESCO	Utilishelf	SLF-004	N/A	N/A
TESCO	Utilishelf	SLF-005	N/A	N/A
TESCO	Utilishelf	SLF-006	N/A	N/A
TESCO	Utilishelf	SLF-007	N/A	N/A
TESCO	Utilishelf	SLF-008	N/A	N/A
TESCO	Utilishelf	SLF-009	N/A	N/A
TESCO	Utilishelf	SLF-010	N/A	N/A
TESCO	Utilishelf	SLF-011	N/A	N/A

TESCO	Utilishelf	SLF-012		N/A	N/A