

EPO No. 52 - Retail Electric Vehicle Fueling Systems
BPC Div. 5, 4 CCR § 4000. 1.10. General Code, 4 CCR § 4000. 3.40. Electric Vehicle Fueling Systems and 4 CCR § 4000. 5.55. Timing Devices

EXAMINATION PROCEDURE OUTLINE (EPO) NO. 52

Retail Electric Vehicle Fueling Systems
BPC Div. 5, 4 CCR § 4000. 1.10. General Code,
4 CCR § 4000. 3.40. Electric Vehicle Fueling Systems and
4 CCR § 4000. 5.55. Timing Devices

The California Department of Food & Agriculture (CDFA) Division of Measurement Standards (DMS) recommends that this Examination Procedure Outline (EPO) be followed as the minimum criteria for examining commercial Retail Electric Vehicle Fueling Systems [EVFS, also known as Electric Vehicle Supply Equipment (EVSE)] and Timing Devices. Inspection and test items common to all categories are detailed in the procedure. Additional information is included for the other categories as listed below (see Table of Contents).

This EPO does not cover EVSEs:

- a. owned, maintained, and used by a public utility or municipality;
- b. used solely for dispensing electrical energy in connection with operations in which the amount dispensed does not affect customer charges or compensation; and
- c. used for the wholesale delivery of electricity.

Requirements that apply to some devices but not others still covered under this EPO are identified by (*). Non-retroactive (NR) requirements are followed by the applicable date in parentheses, e.g., **REF: § 4000. [1.10.] G-S.X.X. (NR 01/01/XX)**

NOTES:

- a. Through Business and Professions Code¹ (BPC) § 12107, the Secretary of CDFA adopts the most current edition of the National Institute of Standards and Technology Handbook 44 (HB 44) with additional language and exceptions.
- b. Enforcement action notices (Notice of Violations, Administrative Actions, and Citations) must include the appropriate BPC authority section(s) and include the applicable California Code of Regulations (CCR)² section(s). (Note: DMS regulations are in Title 4 of the CCR). Please see the following examples.
 - i. BPC § 12107; Title 4 CCR § 4000.
 - Example: Commercial weighing and measuring devices shall, except where noted, conform to the latest requirements set forth in the National Institute of Standards and Technology Handbook 44, *Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices*.

¹ [California Business and Profession Code § 12107](#)

² [California Code of Regulations - Title 4, Division 9, Chapter 1.](#)

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- Example: Title 4 California Code of Regulations § 4000 [1.10.] G-UR.4.1. Maintenance of Equipment.
 - ii. BPC § 12107; Title 4 CCR § 4002.
 - Language added to HB 44 is prefaced with CCR section (§) 4002.X.
 - Example: Title 4 California Code of Regulations § 4002.11. Electric Vehicle Fueling Systems [3.40.] S.1.3.2. EVSE Value of Smallest Unit.
 - iii. BPC § 12107; Title 4 CCR § 4001.
 - Exceptions to HB 44 language are prefaced with CCR section (§) 4001.
 - Example: Title 4 California Code of Regulations § 4001. Electric Vehicle Fueling Systems [3.40]. S.5.2. EVSE Identification and Marking Requirements.
1. Be aware of Title 4 CCR § 4000 [1.10.] General Code paragraph G-N.1. Conflict of Laws and Regulations.
 2. DMS issues Policy Letters and Notices to aid in clarification, provide instruction, and make recommendations to the County Sealers. Many of these notices can be found at: <https://www.cdfa.ca.gov/dms/notices/notices.html>
 3. Safety Notes and Reminders have been included for reference. **It is essential that inspectors become familiar with their employer’s safety policies. Some facilities have specific safety requirements that must be followed.**
 4. Periodic changes to the procedures will be made to accommodate code changes and new developments in device technology. **Before issuing a Notice of Violation (NOV), it is imperative that inspectors verify the violations, including referencing updated requirements.**

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TABLE OF ABBREVIATIONS

<u>Abbreviation</u>	<u>Meaning</u>
A	Application requirement of a code
AC	Alternating Current
BPC	Division 5 of the California Business and Professions Code - Weights and Measures
CC	National Type Evaluation Program Certificate of Conformance
CCR or § 4000	Title 4, Division 9 of the California Code of Regulations
COA	Certificate of Approval - California
CP	Control Pilot
CTEP	California Type Evaluation Program
DAQ	Data Acquisition
DC	Direct Current
EPO	Examination Procedure Outline
EV	Electric Vehicle
EVFS	Electric Vehicle Fueling Systems – HB 44 Title
EVSE	Electric Vehicle Supply Equipment
G	General Code
G-A	General Code Application
G-N	General Code Notes
G-S	General Code Specifications
G-T	General Code Tolerances
G-UR	General Code User Requirements
HB 44	NIST Handbook 44
MDA	Maximum Deliverable Amperes
MMQ	Minimum Measured Quantity
N	Notes for official test procedures
NR	Non-retroactive
NTEP	National Type Evaluation Program
REF	Code Reference(s) used for enforcement of BPC and CCR
RSA	Registered Service Agency
S	Specifications – design requirements
T	Tolerances - performance requirements
UR	User requirements applicable to the selection, use installation and maintenance requirements

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SAFETY NOTES

The inspector is reminded of the importance of evaluating potential safety hazards prior to an inspection and taking adequate precautions to avoid personal injury or damage to property, equipment, or the device. As a minimum, the following safety precautions should be noted and followed during the inspection. Safety policies and regulations vary among jurisdictions. **It is essential that inspectors or servicepersons be aware of all safety regulations and policies in place at the inspection site and to practice their employer's safety policies.** The safety reminders included in this EPO contain general guidelines useful in alerting inspectors and servicepersons to the importance of taking adequate precautions to avoid personal injury. These guidelines can only be effective in improving safety when coupled with training in hazard recognition and control.

Suitable Clothing

Personal Protection Equipment

- e.g., Safety Shoes, Safety Aprons, Gloves, Eye Protection, Hard Hat, etc. if necessary

Transportation of Equipment

Lifting

Location

- Wet/Slick Conditions, Obstructions.

Fire Extinguisher

Emergency Procedures

First Aid Kit

Ignition Sources

Electrical Hazards

Nature of Product - Safety Data Sheets (SDS)

Traffic

Safety Cones/Warning Signs

Grounding/ Static Discharge

SAFETY REMINDER

WARNING

To avoid electrical shock, personal injury, or fire hazard:

- The Field Test Standard and EV Load Emulator must be switched OFF if it is damaged or suspected to be faulty.
- Do not operate the Field Test Standard and EV Load Emulator in wet, condensing, dusty, or explosive gas conditions.
- If the Field Test Standard and EV Load Emulator are used in a manner not specified in the operator's manual, the protection provided by them may be impaired.
- Whenever it is likely that safety protection has been impaired, the Field Test Standard and EV Load Emulator must be made inoperative and be secured against any unintended operation. Inform qualified maintenance or repair personnel.
- Safety protection is likely to be impaired if, for example, the Field Test Standard and / or EV Load Emulator shows visible damage or fails to operate normally.
- Become familiar with and follow safety guidelines.
- Check the inspection site carefully for safety hazards and take appropriate precautions.
- If exposed wiring, etc. cause hazardous testing conditions, the testing is to be discontinued until the unsafe conditions are corrected.
- If applicable, learn the nature of hazardous products used at, or near, the inspection site.
- Post safety cones/warning signs and be aware of vehicular and pedestrian traffic patterns.
- Use caution when moving in wet, slippery areas.
- Use personal protection equipment appropriate for the inspection site.
- Be sure that a first aid kit is available and that the kit is appropriate for the type of inspection activity.

DO NOT ATTEMPT TO REMOVE THE CONNECTOR FROM THE FIELD TEST STANDARD FROM THE EVSE WHILE THE EVSE IS AUTHORIZED!

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PRE-TEST CONSIDERATIONS.

This EPO contains information and warnings that must be observed to ensure safe operation and keep the EVSE Field Test Standard in a safe condition. Operation or service in conditions or in a manner other than specified could compromise safety. For the correct and safe use of this instrument, it is essential that both operating and service personnel follow accepted safety procedures in addition to the safety precautions specified.

Equipment List: The following criteria should be considered when selecting equipment for the test.

Tolerance for Standards.

In accordance with NIST Handbook 44, Appendix A - Fundamental Considerations Section 3 paragraph 3.2, the combined error and uncertainty of any standard used for testing must be less than one-third the applicable device tolerance.

Test Standard: Electric Vehicle Fueling System Field Test Standard.

Ensure field standard capacity and type of voltage matches that of the EVSE under test. The test standards shall be traceable to NIST or other National Measurement Institute signatory of International Committee of Weights and Measures (CIPM) Mutual Recognition Arrangement (MRA) for accuracy.

Test Standard: Field Standard Stopwatch or Interval Timer.

The interval timing device test standard conforms to NIST Handbook 105-5 Specifications and Tolerances for Field Standard Stopwatches or other suitable designated standards. [NIST Handbook 105-5](http://www.nist.gov/pml/wmd/pubs/handbooks.cfm) is available on the NIST OWM website at: <http://www.nist.gov/pml/wmd/pubs/handbooks.cfm>.

A timing device shall be tested using a timepiece with an error of not greater than plus or minus 15 seconds per 24-hour period. In the test of timing devices with a nominal capacity of 1 hour or less, stopwatches with a minimum division of not greater than one fifth second shall be used. In the test of timing devices with a nominal capacity of more than one hour, the value of the minimum division on the timepiece shall not be greater than one second. Time pieces and stopwatches shall be calibrated with standard time signals as described in NIST [Special Publication 432, NIST Time and Frequency Services](#), or any superseding publication.

Additional Equipment: Card or other remote device (RFID, swipe card, etc.) to activate the EVSE for transactions.

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PRE-TEST INSPECTION

REMINDER

- Overall safety condition of the EVSE.
- Report loose, exposed, frayed, or worn EVSE charge cables and damaged or worn connectors to the designated local responsible party.
- Avoid tests while standing on wet surfaces or in environments that expose the EVSE to damp or wet conditions.
- Unobstructed access to the EVSE.
- Verify the EVSE's power capacity, voltage, type of current, amperage, and system's power transfer method, and/or includes an integral timing device and verify compatibility with the test standard.
- Identify method of generating a transaction receipt.
- Identify method of activating the EVSE.
- Ground the test equipment.
- Do not leave an activated dispenser unattended!

1. **Type Approval:** California Type Evaluation Program ([CTEP](#)) Certificate of Approval (COA). [See DMS Notice D-20-02 for Frequently Asked Questions.](#)
 - (a) For devices with a California Type Approval Program (CTEP) Certificate of Approval (COA) see Identification Markings (General). **REF: BPC § 12500.5**
CTEP EVSE devices are not required to be marked with CTEP Certificate of Approval number and must be verified using the make and model (e.g. CTEP database at <https://www.cdfa.ca.gov/dms/programs/ctep/ctep.html>).
 - (b) For devices with a National Type Evaluation Program (NTEP) Certificate of Conformance (CC) number. **REF: § 4000. [1.10.] G-S.1.(e) (NR 1/1/03)**
 - (1) Prefix and acceptable abbreviations.
REF: § 4000. [1.10.] G-S.1.(e)(1) (NR 1/1/03)
 - (c) Unapproved devices are not to be tested or sealed by weights and measures officials. Yellow "unapproved device" tags are to be affixed to devices which are not approved. **REF: BPC § 12500.10**

NOTE: Follow your County protocols regarding "non-commercial" devices (e.g. High School Wrestling Scales).
2. **Effective Dates:** Effective Date for AC EVSE. All AC EVSE used for commercial purposes shall comply with all requirements of this article in accordance with the following:

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- (a) All AC EVSE installed prior to January 1, 2021, shall comply with the requirements of this article by January 1, 2031.
- (b) All AC EVSE installed on or after January 1, 2021, shall comply with the requirements of this article upon installation.
- (c) All DC EVSE used for commercial purposes shall comply with all requirements of this article in accordance with the following:
 - (1) All DC EVSE installed prior to January 1, 2023, shall comply with the requirements of this article by January 1, 2033.
 - (2) All DC EVSE installed on or after January 1, 2023, shall comply with the requirements of this article upon installation.

REF: § 4002.11. [3.40.] A.1.1. Application.

3. Identification Markings (General):

- (a) Lettering. Markings shall be clearly and permanently marked for the purposes of identification. **REF: § 4000. [1.10.] G-S.1.**
 - (1) All required markings and instructions shall be distinct and easily readable and shall be of such character that they will not tend to become obliterated or illegible. **REF: § 4000. [1.10.] G-S.7.**
- (b) Visibility of identification. **REF: § 4000. [1.10.] G-UR.2.1.1.**
- (c) Name, initials, or trademark of manufacturer or distributor. **REF: § 4000. [1.10.] G-S.1.(a) Retroactive**
- (d) Model identifier. **REF: § 4000. [1.10.] G-S.1.(b) Retroactive**
- (e) Model identifier prefix, Acceptable Abbreviations For “Model” And “Number”. **REF: § 4000. [1.10.] G-S.1.(b)(1)(NR 1/1/ 03)**
- (f) Nonrepetitive serial number. **REF: § 4000. [1.10.] G-S.1.(c) (NR 1/1/68)**
- (g) Serial number prefix. **REF: § 4000. [1.10.] G-S.1.(c)(1) (NR 1/1/86)**
- (h) Acceptable abbreviations for “Serial” and “Number”. **REF: § 4000. [1.10.] G-S.1.(c)(2) (NR 1/1/01)**
- (i) Current software version or revision identifier (for not-built-for-purpose software-based devices). **REF: § 4000. [1.10.] G-S.1.(d) (NR 1/1/04)**
 - (1) Software version or revision identifier, software-based devices. **REF: § 4000. [1.10.] G-S.1.(c)(2)(NR 1/1/01)**
 - (2) Software version or revision identifier for not-built-for-purpose software-based devices. **REF: § 4000. [1.10.] G-S.1.(d)**
 - (3) Software version or revision identifier for all software-based devices. **REF: § 4000. [1.10.] G-S.1.(d)(1)i (NR 1/1/07)**
 - (4) Software version or revision identifier preface. **REF: § 4000. [1.10.] G-S.1.(d)(1)(i) (NR 1/1/07)**

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- (5) Software version or revision identifier continuously displayed or accessible via the display. **REF: § 4000. [1.10] G-S.1.(d)(ii) (NR 1/1/22)**
- (6) Abbreviations for “version”. **REF: § 4000. [1.10] G-S.1.(d)(2) (NR 1/1/07)**
- (7) NTEP CC Number. **REF: § 4000. [1.10] G-S.1.(e)(1) (NR 1/1/03)**
- (8) NTEP CC Number Identifier. **REF: § 4000. [1.10] G-S.1.1.(1/1/04)**
- (9) Location Info Not-Built-For Purpose Software-Based Devices. **REF: § 4000. [1.10] G-S.1.2. (1/1/02)**
- (j) Acceptable abbreviations for version, revision, and number. **REF: § 4000. [1.10.] G-S.1.d.(2) (NR 1/1/03)**
- (k) NTEP CC number (for devices that have an NTEP CC). **REF: § 4000. [1.10.] G-S.1.(e) (NR 1/1/03)**
 - (1) Prefix and acceptable abbreviations. **REF: § 4000. [1.10.] G-S.1.(e)(1) (NR 1/1/03)**
- (l) Operational controls, indications, and features. **REF: § 4000. [1.10.] G-S.6. (NR 1/1/77)**
- (m) Temperature Range for System Components. **REF: CCR § 4002.11 [3.40.] S.3.5.**
 - (1) Temperature range shall be conspicuously, legibly, and indelibly marked on the EVSE if the temperature range is not capable of meeting the standard range of -40 °C to + 85 °C (-40 °F to 185 °F) and installations shall be limited to the narrower temperature limits in operation.
- (n) Timing Device Marking Requirements. Operating instructions shall be clearly stated in the EVSE. **REF: § 4000. [5.55.] S.2.**
- (o) EVSE Identification and Marking Requirements are conspicuously, legibly, and indelibly marked. **REF: CCR § 4002.11 [3.40.] S.5.2.**
 - (1) Voltage rating;
 - (2) Maximum current deliverable;
 - (3) Type of current (AC or DC or, if capable of both, both shall be listed);
 - (4) Minimum measured quantity (MMQ); and
 - (5) Temperature limits, if narrower than and within -40 °C to + 85 °C (-40 °F to 185 °F).
- (p) Abbreviations and Symbols. – The following abbreviations or symbols may appear on an EVSE system. **REF: § 4000. [3.40.] S.5.3.**
 - (1) VAC = volts alternating current;
 - (2) VDC = volts direct current;
 - (3) MDA = maximum deliverable amperes; and
 - (4) J = joule.

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4. Additional Marking Requirements:

- (a) Identification of Service Agency work. **REF: § 4085.(a)(4)**
 - (1) Conspicuously located adhesive tag or label.
 - (2) Name, registration number, business telephone, service agent license number, and date.
- (b) Interchange or reversal of parts. **REF: § 4000. [1.10.] G-S.4.**
- (c) Responsibility Money Operated and Unattended Device. **REF: § 4000. [1.10.] G UR.3.4., [3.40.] UR.2.5.**
- (d) Temperature range, if other than - 40 °F to 185 °F. **REF: § 4002.11 [3.40.] S.3.5.**
- (e) Location of marking information. **REF: § 4000. [3.40.] S.5.1.**
 - (1) Between 24 inches and 60 inches from ground level.
 - (2) On a portion of the EVSE that cannot be removed or interchanged.

5. Selection:

- (a) Suitability.
 - (1) Commercial equipment shall be suitable for the service in which it is used with respect to elements of its design, including but not limited to its computing capability, the character, number, size, and location of its indicating or recording elements, and the value of its smallest unit and unit prices. **REF: § 4000. [1.10.] G-UR.1.1.**
 - (2) Permanence. **REF: § 4000. [1.10.] G-S.3.**
 - (3) Environment. **REF: § 4000. [1.10.] G-UR.1.2.**
 - (4) Computing -Type EVSE shall indicate the electrical energy, unit price and total price. **REF: § 4000. [3.40.] UR.1.1.**
 - (5) Connection Cord-Length. Means for cord management shall be in use when the cord exceeds 25 ft in length. **REF: § 4000. [3.40.] UR.1.2.**
- (b) Installation Requirements.
 - (1) The EVSE system shall be installed, constructed, and/or assembled in a manner that does not facilitate the perpetration of fraud. **REF: § 4000. [1.10.] G-S.2.**
 - (2) In accordance with manufacturer's instructions.
 - i. The marked maximum current shall not exceed the marked MDA. **REF: § 4000. [3.40] UR.2.1.**
 - ii. Installed in accordance to manufacturer's instructions and shall be secured and rigid. **REF: § 4000. [1.10.] G-UR.2.1., [2.20.] UR.2.2.**
 - iii. The current and voltage shall not exceed the rated maximum values. **REF: § 4000. [3.40] UR.2.3.**

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- iv. If any provisions in paragraph UR.2. are less stringent than required of a similar installation by the serving utility, the installation shall be in accordance with the serving utility requirements,
REF: § 4000. [3.40.] UR.2.4.
- v. An unattended EVSE shall have clearly and conspicuously display adequate information detailing the names, address, and phone number of the local responsible party. **REF: § 4000. [3.40.] UR.2.5.**
- (3) A system is installed so that there is no obstruction between the primary indicating or recording element and the measuring element.
REF: § 4000. [1.10.] G-UR.2.2.
- (4) Position of Equipment. An EVSE system equipped with a primary indicating element and used in direct sales shall be positioned so that its indications may be accurately read, and the measuring operation may be observed from some reasonable “customer” and “operator” position.
REF: § 4000. [1.10.] G-UR.3.3.
- (5) The EVSE system shall be installed such that that any reversal of energy flow does not result in errors exceeding tolerance.
REF: § 4000. [3.40.] S.4.2.
- (6) The marked maximum deliverable current (MDA) shall not exceed the total capacity in amperes of the EVSE or the thermal overload protectors.
REF: § 4000. [3.40.] UR.2.1.
- (7) The EVSE shall be installed so that the current and voltage will not exceed the rated maximum values over which the EVSE is designed to continuously operate. If necessary, means to limit current and/or voltage shall be incorporated in the installation. **REF: § 4000. [3.40.] UR.2.3.**
- (8) If the provisions of UR.2. Installation Requirements are less stringent than that required of a similar installation by the serving utility, the installation shall be in accordance with those requirements of the serving utility. The installer of any EVSE shall obtain all necessary permits.
REF: § 4000. [3.40.] UR.2.4.
- (c) Accessibility and Assistance.
 - (1) A device shall be located, or such facilities for normal access thereto shall be provided, to permit testing and sealing. **REF: § 4000. [1.10.] G-UR.2.3.**
 - (2) Device must be readily accessibility for purposes of testing. Assistance, special equipment, accessories, or an abnormal amount of labor shall be provided by the owner or operator of the device, if needed.
REF: § 4000. [1.10.] G-UR.4.4.
- (d) Use and Maintenance.
 - (1) Equipment shall be operated only in the manner that is obviously indicated by its construction or that is indicated by instructions on the equipment.
REF: § 4000. [1.10.] G-UR.3.1.

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- (2) All equipment in service and all mechanisms and devices attached thereto or used in connection therewith shall be continuously maintained in proper operating condition throughout the period of such service.
REF: § 4000. [1.10.] G-UR.4.1.
- (3) Unstable indications or other abnormal equipment performance observed during operation shall be corrected and, if necessary, brought to the attention of competent service personnel. **REF: § 4000. [1.10.] G-UR.4.2.**
- (4) Computing Capability. Recorded money value and any digital money-value indication on a computing-type EVSE device used for commercial purposes shall be in mathematical agreement with its associated quantity representation or indication to the nearest 1 cent of money value.
REF: § 4000. [1.10.] G-S.5.5, [3.40.] UR.1.1.

6. Indicating and Recording Elements.

- (a) Primary Indication. All devices shall be provided with indicating or recording elements appropriate in design and adequate in amount. Primary indications and recorded representations shall be clear, definite, accurate, and easily read under any conditions of normal operation of the device.
REF: § 4000. [1.10.] G S.5.1., [3.40.] S.1.2.
- (b) Values of Intervals.
 - (1) The values of the increments shall be uniform throughout the series.
REF: § 4000. [1.10.] G-S.5.3.
 - (2) On devices designed to indicate or record in more than one unit of measurement, the values indicated and recorded shall be identified with an appropriate word, symbol, or abbreviation.
REF: § 4000. [1.10.] G-S.5.3.1.
- (c) Digital Indications and Representations. **REF: § 4000. [1.10.] G-S.5.2.2.**
 - (1) All digital values of like value agree with one another. Digital & associated analog values agree to the nearest minimum graduation. Digital values 'round off' to nearest minimum unit that can be indicated or recorded.
 - (2) Zero indication includes display of zero for all places to right of decimal and at least one place to the left. **(NR 1/1/86)**
- (d) A system with a single indicating element for two or more EVSEs shall be provided with means to display information from the individual EVSE(s) selected or displayed and shall be provided with an automatic means to indicate clearly which EVSE is associated with the displayed information.
REF: § 4000. [3.40.] S.1.2.1.
- (e) An EVSE used to charge electric vehicles shall include;
 - (1) An indicating element that accumulates continuously and displays for a minimum of 15 seconds upon activation by the user and at the start and end of the transaction,

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- (2) The correct measurement results relative to quantity and total price, and
- (3) No interference between the time and electrical energy measurement elements of the system.

Indications and representations of electricity sold shall be clearly identified and separated from other time-based fees indicated by an EVSE that is used for both the sale of electricity as vehicle fuel and the sale of other separate time-based services (e.g., vehicle parking).

REF: § 4000. [3.40.] S.1.2., S.1.2.1., [5.55.] S.3.

- 7. **Units.** Value of the smallest unit indicated and recorded (if equipped with a recording element), shall be 0.0005 MJ or 0.0001 kWh.
REF: CCR § 4000. [3.40.] S.1.3.1., § 4002.11 [3.40.] S.1.3.2.
- 8. **Timing Devices.** Value of the smallest unit shall not exceed;
REF: § 4000. [5.55.] S.1.1.2., S.1.1.3. (a), (b), (c).
 - (a) One-half hour on parking meters indicating time in excess of two hours;
 - (b) Six minutes on parking meters indicating time in excess of one hour but not greater than two hours; or
 - (c) Five minutes on all other devices, except those equipped with an in-service light.
- 9. **EVSE Unit Price.** An EVSE shall be able to indicate on each face:
 - (a) The unit price at which the EVSE is set to compute or to dispense at any point in time during a transaction. A computing EVSE shall display the unit price in whole cents (e.g., \$0.12) or tenths of one cent (e.g., \$0.119) on the basis of price per megajoule (MJ) or kilowatt-hour (kWh). In cases where the electrical energy is unlimited or free of charge, this fact shall be clearly indicated in place of the unit price. **REF: § 4002.11. [3.40.] S.2.4.1., 4000. [3.40.] UR.3.1.**
 - (b) The maximum rate of energy transfer (i.e., maximum power) and the type of current associated with each unit price offered (e.g., 7 kW AC, 25 kW DC, etc.).
REF: § 4002.11. [3.40.] S.2.4.2.
- 10. **EVSE Indications.** An EVSE shall be able to indicate on each face, the unit price at which the EVSE is set to compute, or
 - (a) Dispense at any point in time during a transaction;
 - (b) Shall display the unit price in whole cents (e.g., \$0.12) or tenths of one cent (e.g., \$0.119) based on the of price per megajoule (MJ) or kilowatt-hour (kWh).
 - (c) In cases where the electrical energy is unlimited or free of charge, this fact shall be clearly indicated in place of the unit price.**REF: CCR § 4002.11. [3.40.] S.2.4.1.**
- 11. **Statement of Rates (Timing Devices).** **REF: § 4000. [5.55.] UR.1.**
 - (a) The following information shall be clearly, prominently, and conspicuously displayed:

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- (1) The price in terms of money per unit; and
 - (2) Units of time for the service dispensed.
- (b) EVSE multiple unit prices.
- (1) An EVSE used to charge electric vehicles shall be of the computing type and shall indicate the electrical energy, the unit price, and the total price of each transaction. **REF: § 4000. [3.40.] S.1.1., UR.1.1.**
 - (2) EVSEs capable of applying multiple unit prices over the course of a single transaction shall also be capable of indicating the start and stop time, the total quantity of energy delivered, the unit price, and the total price for the quantity of energy delivered during each discrete phase corresponding to one of the multiple unit prices. **REF: § 4000. [3.40.] S.1.1.(a)**
 - (3) When electrical energy is offered for sale at more than one unit price through an EVSE, the selection of the unit price shall be made prior to delivery through a deliberate action of the purchaser to select the unit price for the fuel delivery. Except when the conditions for variable price structure have been approved by the customer prior to the sale, a system shall not permit a change to the unit price during delivery of electrical energy. **REF: § 4000. [3.40.] S.2.4.3.**
 - (4) An EVSE shall compute the total sales price at any single-purchase unit price for which the electrical energy being measured is offered for sale at any delivery possible within either the measurement range of the EVSE or the range of the computing elements, whichever is less. **REF: § 4000. [3.40.] S.2.5.**

12. Indication of Delivery.

- (a) The EVSE shall automatically display on its face the initial zero condition and the quantity delivered. **REF: CCR § 4002.11 [3.40.] S.2.7.**
- (b) In-service Indicator Light (if applicable). **REF: § 4000. [5.55.] S.1.1.3.(c), S.1.1.5.**
- (c) Money-value Divisions. The total price computation shall be based on quantities not exceeding 0.5 MJ or 0.1 kWh. **REF: § 4000. [1.10.] G-S.5.5., [3.40.] S.2.5.1.**
- (d) Auxiliary Indications. All indicated money value and quantity divisions of the auxiliary element shall be identical to those of the primary element. **REF: § 4000. [3.40.] S.2.5.2.**

13. Unit Price (EVSE for time-based and other services). **REF: § 4000. [3.40.] S.1.1.(b)**

EVSEs capable of applying additional fees for time-based and other services shall also be capable of indicating the;

- (a) Total time purchased;
- (b) Unit price(s) for the additional time-based service(s);
- (c) Total computed price(s) for the time measured; and

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- (d) The total transaction price, including the total price for the energy and all additional fees.
14. **EVSE Units of Measurement.** – EVSE units used to charge electric vehicles shall be indicated and recorded in megajoules (MJ) or kilowatt-hours (kWh) and decimal subdivisions. **REF: § 4000. [3.40.] S.1.3.1.**
15. **Recorded Representations.** The requirements for indicating and recording elements shall also apply to recorded representations. All recorded values shall be printed digitally. The customer may be given the option of not receiving the recorded representation. For systems equipped with the capability of issuing an electronic receipt, ticket, or other recorded representation, the customer may be given the option to receive any required information electronically (e.g., via cell phone, computer, etc.) in lieu of or in addition to a hard copy. **REF: § 4000. [1.10.] G-S.5.6.**
16. **EVSE Recorded Representations.** A receipt, either printed or electronic, providing the following information shall be available at the completion of all transactions: **REF: § 4000. [3.40.] S.2.6., S.6., S.6.1., UR.3.3.**
- (a) The total quantity of the energy delivered with unit of measure the total computed price of the energy sale;
 - (b) The unit price of the energy;
 - (c) For systems capable of applying multiple unit prices for energy during a single transaction, the following additional information is required:
 - (1) The start and stop time of each phase during which one of the multiple unit prices was applied;
 - (2) The unit price applied during each phase;
 - (3) The total quantity of energy delivered during each phase; and
 - (4) The total purchase price for the quantity of energy delivered during each phase.
 - (d) The Maximum Rate of Energy Transfer (i.e., maximum power) and type of current (e.g., 7 kw AC, 25 kw DC, etc.);
 - (e) Any additional separate charges included in the transaction (e.g., charges for parking time) including:
 - (1) The time and date when the service begins and the time and date when the service ends; or the total time interval purchased, and the time and date that the service either begins or ends;
 - (2) The unit price applied for the time-based service; and
 - (3) The total purchase price for the quantity of time measured during the complete transaction;
 - (f) The final total price of the complete transaction including all items;
 - (g) The unique EVSE identification number;

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- (h) The business name; and
- (i) The business location.

17. Provision for Sealing.

- (a) A device shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that affects the metrological integrity of the device can be made to any electronic mechanism. **REF: § 4000. [1.10] G-S.8. (NR 1/1/90), [3.40.] S.3.3.**
- (b) A security seal shall be appropriately affixed to any adjustment mechanism designed to be sealed. **REF: § 4000. [1.10.] G-UR.4.5.**
- (c) A device may be fitted with an automatic or a semi-automatic calibration mechanism. This mechanism shall be incorporated inside the device. After sealing, neither the mechanism nor the calibration process shall facilitate fraud. **REF: § 4000. [1.10.] G-S.8. Retroactive**
- (d) Sealing multiple measuring elements with a common provision for sealing. **REF: § 4000. [1.10.] G-S.8.1. (NR 1/1/10)**
 - (1) A change to any metrological parameter (calibration or configuration) shall be individually identified.
 - (2) For devices that utilize an electronic form of sealing, in addition to the requirements in G-S.8.1., any appropriate audit trail requirements in an applicable specific device code also apply. Examples of identification of a change to the metrological parameters of an element include, but are not limited to:
 - i. A broken, missing, or replaced physical seal on an indicating element or active junction box;
 - ii. A change in a calibration factor or configuration setting for each element;
 - iii. A display of the date of calibration or configuration event for each element; or
 - iv. Counters indicating the number of calibration and/or configuration events for each element.
- (e) Sealing Removable Digital Storage Device (DSD). This applies only to removable DSDs that remain in the device or system for it to be operational in which the configuration or calibration parameters can be changed by use of a DSD, such as a secure digital (SD) card, Universal Serial Bus (USB) flash drive, etc. Security shall be provided for those parameters using either:
 - (1) A Category 3 Method of Sealing;
 - (2) A physical seal that must be broken in order to remove the DSD from the device; or

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- (3) For sealable parameters using other than a DSD, adequate provisions shall be made to provide security for the timing element.

REF: § 4000. [1.10.] G-S.8.2., [3.40.] S.3.3.

PRE-TEST DETERMINATIONS

- 1. **Applicability of Tolerances (Acceptance & Maintenance).**
REF: § 4000. [1.10.] G-T.1., only (a) & (e), G-T.2.
- 2. **Application.** REF: § 4000. [1.10] G-T.3.
- 3. **Tolerance Values:** REF: CCR § 4002.11 [3.40.] T.2., Table T.2.

Table T.2. Accuracy Classes and Tolerances for EVSE			
<i>Accuracy Class</i>	<i>Application or Commodity Being Measured</i>	<i>Acceptance Tolerance</i>	<i>Maintenance Tolerance</i>
2.0	AC electricity as a vehicle fuel	1.0 %	2.0 %
5.0¹	DC electricity as a vehicle fuel	2.5 %	5.0 %
2.0²	DC electricity as a vehicle fuel	1.0 %	2.0 %
¹ The tolerance values for Accuracy Class 5.0 DC EVSE are applicable to devices installed prior to January 1, 2033. ² The tolerance values for Accuracy Class 2.0 DC EVSE are applicable to devices installed on or after January 1, 2033.			

Figure 1 - Table 2. Accuracy Classes and Tolerances for EVSE.

- 4. **Repeatability Tolerances (if necessary).** Repeatability tests shall include a minimum of three consecutive tests at the same load, similar time period, etc., and be conducted under conditions where **variations** in factors are reduced to minimize the effect on the results obtained. The range of the load test results shall not exceed 25 % of the absolute value of the maintenance tolerance and the results of each test shall be within the applicable tolerance. **REF: § 4000. [3.40.] N.6., T.3.**
- 5. **Other Considerations:**
 - (a) Necessary equipment and tools:
 - (1) Suitability of EVSE standards.
 - (2) Seals, seal press, etc.
 - (b) Potential hazards including traffic:
 - (1) Properties of product.
 - (2) Overall safety condition of the EVSE.
 - (3) Report loose, exposed, frayed, or worn EVSE charge cables and damaged or worn connectors to the designated local responsible party.

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- (4) Avoid tests while standing on wet surfaces or in environments that expose the EVSE to damp or wet conditions.

TEST NOTES

1. **Conflict of Laws and Regulations.** If any provisions of these specifications, tolerances, and other requirements are found to conflict with existing state laws, or with existing regulations or local ordinances relating to health, safety, or fire prevention, the enforcement of such provisions shall be suspended until conflicting requirements can be harmonized. Such suspension shall not affect the validity or enforcement of the remaining provisions of these specifications, tolerances, and other requirements. **REF: § 4000. [1.10.] G-N.1.**
2. **Testing with Non-Associated Equipment.** (e.g. RFI/EMI). Tests to determine conditions, such as radio frequency interference (RFI) and/or electromagnetic interference (EMI) that may adversely affect the performance of a device shall be conducted with equipment and under conditions that are usual and customary with respect to the location and use of the device. **REF: § 4000. [1.10.] G-N.2.**
 - (a) Prepare Test Standard(s). (positioning, grounding, etc.).
 - (b) Totalizer. Beginning and ending readings of electrical energy. **REF: § 4000. [3.40.] S.7.**
 - (c) Test Standard Set-up. Select the appropriate setup for the test standard; such as type of current, plug type, etc.
 - (d) Follow the manufacturer's procedures.
 - (e) Verify that the Control Pilot Maximum Deliverable Amperage is equal to or less than the Maximum Current Deliverable marked on the EVSE.
3. **Identify the Method to Initiate the EVSE.** Identify method for initiating the transaction/session (e.g. app., card, etc.).
 - (a) Verify that the measurements are continuously accumulating and displaying the quantity and total price for at least 15 seconds at the activation by the user and at the start and end of the transaction. **REF: § 4000. [3.40] S.1.2.**
 - (b) Read and record the totalizer indications before and after all test drafts to determine proper operation of totalizers. **REF: § 4000. [3.40] S.7.**
4. **After each test draft:**
 - (a) Verify that required information on the printed or electronic receipt. **REF: § 4000. [3.40] S.2.6., S.6., S.6.1., UR.3.3.**
 - (b) Verify that any options for obtaining a recorded representation are appropriate (e.g. hard copy, text, email, etc.). The customer may be given the option of not receiving the recorded representation. **REF: § 4000. [1.10.]**

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- (1) Printed tickets, either printed by the EVSE or pre-printed require: EVSE identification number (dispenser), time, date, and name of seller.
REF: § 4000. [3.40] S.6.1.
 - (2) Recorded representation includes itemized timing charges when time services assessed separately from charges for electrical energy as specified in Section 3.40. Electric Vehicle Fueling Systems paragraph S.2.6. EVSE Recorded Representations. **REF: § 4000. [5.55.] S.1.4.1.**
 - (3) Appropriate abbreviations for indicated and recorded representation of units. **REF: § 4000. [1.10.] G-S.5.6.1., [3.40] S.2.6.**
 - (4) For charges based on time, duplicate receipts are permissible, provided the word “duplicate” or “copy” is included on the receipt.
REF: § 4000. [5.55.] S.1.4.1.1.
- (c) Check:
- (1) Price computations on all indicators (including consoles) and on recorded representations for mathematical agreement with its associated quantity representation or indication to the nearest 1 cent of money value.
REF: § 4000. [1.10.] G-S.5.5., [3.40.] S.2.5., S.2.5.1.
 - (2) Agreement of quantity, unit price, and total price values between indicated and recorded representations. **REF: § 4000. [1.10.] G-S.5.2.2., [3.40.] S.2.4.4., S.2.5.2.**
- (d) After a delivery is completed, verify that the quantity and total price are displayed for at least 15 seconds. **REF: § 4000. [3.40] S.1.2.**

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SAFETY REMINDER

- **Use proper lifting techniques when lifting a test equipment.**
- **Be aware of vehicular and pedestrian traffic in the vicinity of the EVSE.**
- **Do not disconnect the test standard from the EVSE during the tests.**

TESTS

The NO LOAD TEST and STARTING LOAD TEST and may be conducted at the discretion of the regulatory official.

1. **Activate the EVSE.** Note: The EVSE may need to be reauthorized for each “NO LOAD”, “STARTING LOAD”, “ACCURACY TEST”, and “FULL LOAD” tests.

NOTE: The TESCO Field Test Standard instruction manual is available at:
https://www.tescometering.com/wp-content/uploads/2019/05/EVSE-Manual_07.05.19.pdf

2. **Verify the Initial Zero Condition.** Verify at the beginning of each initial delivery.
REF: § 4000. [3.40.] S.2.1.

3. **No Load Test, and Load Test Tolerance. REF: § 4000. [3.40.] N.1., T.5.**

- (a) The purpose of this test is to verify that the EVSE does not advance the indication after connecting the EVSE to the Field Test Standard.
- (b) Start energy measurement on the Field Test Standard.
- (c) Start a charging transaction on the EVSE.
- (d) Verify that the transaction on the EVSE has completed.
- (e) Record the energy delivered as displayed on the EVSE.
- (f) Record the energy delivered as displayed on the Field Test Standard.
- (g) Verify there is no registration of energy delivered as displayed on the EVSE.
- (h) For this and subsequent tests, verify that other conditions of use do not exceed marked or manufacturer-specified limitations.

REF: § 4000. [1.10.] G-UR.3., [3.40] UR.2., CCR § 4002.11 [3.40.] S.5.2.

4. **Starting Load Test, and General and Load Test Tolerances.**

REF: § 4000. [3.40.] T.1., T.6., CCR § 4002.11 [3.40.] N.2.

- (a) The purpose of this test is to verify that the EVSE advances the indication after connecting the EVSE to the Field Test Standard and a load is applied. Connect the EVSE to the Field Test Standard.
- (b) Set the Field Test Standard load to 0.5 amps (recommended duration is 30 seconds).

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- (c) Start energy measurement on the Field Test Standard.
- (d) Start a charging transaction on the EVSE.
- (e) Verify that the transaction on the EVSE has completed.
- (f) Record the energy delivered as displayed on the EVSE.
- (g) Record the energy delivered as displayed on the Field Test Standard.

5. Light Load Accuracy Test.

REF: § 4000. [3.40.] N.3., N.5., T.1, CCR § 4002.11 [3.40.] T.2.

- (a) Connect the EVSE to the Field Test Standard.
 - (1) Based on the Control Pilot (CP) signal, determine the maximum current (e.g. 50 amps) available from the EVSE.
 - (2) Set the Field Test Standard load to a value not greater than 10 % of the available current.

- (b) Start energy measurement on the Field Test Standard.
- (c) Start a charging transaction on the EVSE.
- (d) Continue the measurement for an accumulated energy of not less than the minimum measured quantity (MMQ) declared by the manufacturer.

NOTE: The regulatory official may conduct a screening test for accuracy at less than the manufacturer's MMQ (minimum time 5 minutes). If screening test fails, the official shall conduct the full accuracy test to determine compliance with applicable tolerances.

- (e) Verify that the transaction on the EVSE has completed.
- (f) Record the energy delivered as displayed on the EVSE.
- (g) Record the price per kWh.
- (h) Record the total price of the transaction.
- (i) Record the energy delivered as displayed on the Field Test Standard.
- (j) Based on the unit price(s) [fixed or variable] per kWh, calculate and record the itemized and total computed price for the transaction.
- (k) Determine the energy measurement as follows. The EVSE indication of energy, minus the Test Standard Indicated Energy divided by the Test Standard Energy, then multiply the result by 100 equals the percent Energy Error.

$$\% \text{ Energy Error} = \left(\frac{\text{EVSE Indicated Energy} - \text{Test Standard Indicated Energy}}{\text{Test Standard Indicated Energy}} \right) \times 100$$

Figure 2 - Energy Measurement Calculation

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- (l) Determine the sales price by calculating as follows. The indicated quantity of energy multiplied by the energy unit price equals the sales price plus or minus one-half cent. **REF: § 4000. [1.10] G-S.5.5., [3.40.] S.2.5.1.**

$$\text{Quantity of Energy} \times \text{Energy Unit Price (\$/kWh)} = \text{Sales Price} \pm \frac{1}{2} \text{ cent}$$

Figure 3 – Quantity of Energy Multiplied by Unit Price (Dollars per kilowatt hours) Equals Sales Price ± One-half Cent.

- (m) Verify the resulting energy indications and recorded representations are within applicable tolerances.
- (n) Verify the energy sales price indications and recorded representations agree to within the nearest one cent of the mathematically computed money value, and those money values agree with one another.
REF: § 4000. [1.10] G-S.5.2.2., G-S.5.5.
- (o) If the result of the first test is at or near the tolerance limit, repeat this test. If necessary, conduct a Repeatability Test.
REF: § 4000. [1.10] G-S.5.4., [3.40.] N.6., T.3.

6. Full Load Accuracy Test.

- (a) Connect the EVSE to the Field Test Standard.
- (b) Based on the CP signal determine the maximum current available from the EVSE.
- (c) Set the Field Test Standard load to a value not less than 85 % of the MDA and at least two times the MMQ. If the MDA would result in a maximum deliverable power greater than 7.2 kW, perform the test at 7.2 kW.
- (d) Start energy measurement on the Field Test Standard.
- (e) Start a charging transaction on the EVSE. Continue the measurement for an accumulated energy of not less than twice the minimum measured quantity (MMQ) specified by the manufacturer.
- (f) Verify that the transaction on the EVSE has completed.
- (g) Record the energy delivered as displayed on the EVSE.
(1) Record the price per kWh.
(2) Record the total price of the transaction.
- (h) Record the energy delivered as displayed on the Field Test Standard.
- (i) Based on the unit price(s) [fixed or variable] per kWh, calculate and record the itemized and total computed price for the transaction.

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- (j) Determine the energy measurement as follows. The EVSE indication of energy, minus the Field Test Standard Indicated Energy divided by the Test Standard Energy, then multiply the result by 100 equals the percent Energy.

$$\% \text{ Energy Error} = \left(\frac{\text{EVSE Indicated Energy} - \text{Test Standard Indicated Energy}}{\text{Test Standard Indicated Energy}} \right) \times 100$$

Figure 4 - Energy Measurement Calculation

Repeat the Full Load Test if the result of the first test is at or near the tolerance limit. If necessary, conduct a Repeatability Test.

REF: § 4000. [1.10] G-S.5.4., [3.40.] N.6., T.3.

- (k) Determine the sales price by calculating as follows. The indicated quantity of energy multiplied by the energy unit price equals the sales price plus or minus one-half cent. **REF: § 4000. [1.10] G-S.5.5., [3.40.] S.2.5.1.**

$$\text{Quantity of Energy} \times \text{Energy Unit Price (\$/kWh)} = \text{Sales Price} \pm \frac{1}{2} \text{ cent}$$

Figure 5 - Calculating the Sales Price

- (l) Verify the resulting energy indications and recorded representations are within applicable tolerances.
- (m) Verify the energy sales price indications and recorded representations agree to within the nearest one cent of the mathematically computed money value, and those money values agree with one another.
REF: § 4000. [1.10] G-S.5.2.2., G-S.5.5.

7. **Repeatability Test.** If necessary, conduct a repeatability test. A repeatability test must include at least three consecutive test loads. Test loads must be conducted under approximately the same load conditions. **REF: § 4000. [1.10.] G-S.5.4., [3.40.] N.6., T.3.**

8. **Radio Frequency Interference (RFI) / Electromagnetic Interference (EMI) Test.** A system shall meet performance requirements when associated and nonassociated equipment is operated in a customary manner and location. This testing is typically done only if a problem is suspected or during the inspection of a new installation.
REF: § 4000. [1.10.] G-N.2., G UR.1.2., G-UR.3.2., G-UR.4.2

9. **Timing Device Accuracy Test.** **REF: § 4000. [5.55.] N.1., T.1.3.**

NOTE: A timing device shall be tested with a timepiece with an error of not greater than plus or minus 15 seconds per 24-hour period;

- (a) In the test of timing devices with a nominal capacity of one hour or less, stopwatches with a minimum division of not greater of than one-fifth second shall be used.

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- (b) In the test of timing devices with a nominal capacity of more than one hour, the value of the minimum division on the timepiece shall be not greater than one second.
- (c) Determine the final total price of the complete transaction.
- (d) The sales price indications and recorded representations for other services shall agree to within the nearest one cent of the mathematically computed money value. The money values of like value shall agree with one another.
REF: § 4000. [1.10.] G-S.5.2.2.(a) .

The duration of time accuracy tests to be determined by the jurisdiction based in part on the typical length of time-based service(s) at an EVSE.

REF: § 4000. [1.10] G-S.5.4.,[5.55.] N.1., T.1.3., Table T.1.3.

Table T.1.3. Maintenance and Acceptance Tolerances for Parking Meters and Other Timing Devices Used to Assess Charges for Parking		
Maintenance and Acceptance Tolerances		
Nominal Time Capacity	On Overregistration	On Underregistration
30 minutes or less	No tolerance	10 seconds per minute, but not less than 2 minutes
Over 30 minutes to and including 1 hour	No tolerance	5 minutes plus 4 seconds per minute over 30 minutes
Over 1 hour	No tolerance	7 minutes plus 2 minutes per hour over 1 hour

10. **Zero-Setback Interlock.** Check the effectiveness of the zero-setback interlock.
REF: § 4000. [3.40.] S.2.2.

On equipment activated with a single remote controller, activate one EVSE and check all others operated by the same controller to make certain they will not operate without activating the individual EVSE starting mechanism.

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POST-TEST TASKS

1. Security Means.

(a) Check for the presence of security seals on the device. A security seal shall be affixed to any adjustment mechanism designed to be sealed. Document missing seals on the official report and apply new ones as needed.

REF: § 4000. [1.10.] G-S.8. (Portions NR 1/1/90), G-UR.4.5., [3.40.] S.3.3.

(b) Record audit trail information if the device is equipped with an audit trail.

REF: § 4000. [1.10.] G-S.8. (Portions NR 1/1/90), [3.40.] S.3.3., Table S.3.3.

(c) Do not seal a device if components which are intended to be inaccessible are accessible because of broken or missing glass, locks, etc. (maintenance of equipment) **REF: § 4000. [1.10.] G-UR.4.1., G-UR.4.3.**

2. Results. Review results after all equipment at a location has been tested to determine compliance with specifications, tolerances, and other technical requirements.

NOTE: Predominance of error in direction favorable to device user. Become familiar with your County Policy for interpretation and enforcement of this code section.

REF: § 4000. [1.10.] G-UR.4.1.

3. Clean up.

(a) Collect your equipment and tools.

(b) Return all product necessary for testing if applicable.

(c) Return all tools, equipment, keys, etc. to responsible personnel.

4. Documentation.

(a) Record the results, compliance actions, and disposition of the device(s) on the report.

(b) Consider documenting non-compliant devices, identification markings, missing security seals, etc., with photographs.

(c) Record audit trail information if the device is equipped with an audit trail

(d) Record Registered Service Agency (RSA) Information:

(1) RSAs shall replace a security seal on any adjustment mechanisms where the seal was required to be removed. The RSA security seal shall show the registration number of the service agency and the year the security seal was placed on the device. **REF: CCR §§ 4085(a)(3) & 4085(a)(4).**

(2) Identification of Service Agent Work shall be adhesive tag or label in a conspicuous location on the device. **REF: CCR § 4085(a)(4).**

i. Name, Registration Number, and business telephone number of the agency.

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- ii. The license number of the service agent who performed the work and the date.
- iii. Certificate of Accuracy of Standards. On request from a sealer, a service agency shall show a copy of the certification of accuracy for the standards used to place a device into service.
REF: CCR § 4085(a)(5).
- iv. If available, explain and provide the results to the device owner.

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ATTACHMENTS

NOTES: To CDFA DMS' knowledge, the TESCO EVSE TESTER (Field Test Standard) is currently the only commercially available test device.

Other manufacturers of traceable EVSE Field Test Standards may have different testing procedures. Additional EVSE Field Test Standards that meet the Fundamental Considerations in NIST Handbook 44 Appendix A.3. Testing Apparatus will be added to the EPO.

It is advisable to keep a copy of the EVSE tester instructions with the Field Test Standard.

TESCO's Field Test Standard instruction manual can be downloaded at:

https://www.tescometering.com/wp-content/uploads/2019/05/EVSE-Manual_07.05.19.pdf

EXAMPLE: EVSE Standard – TESCO T400 EVSE TESTER

Set-up and placement of the Field Test Standard and EV Load Emulator.

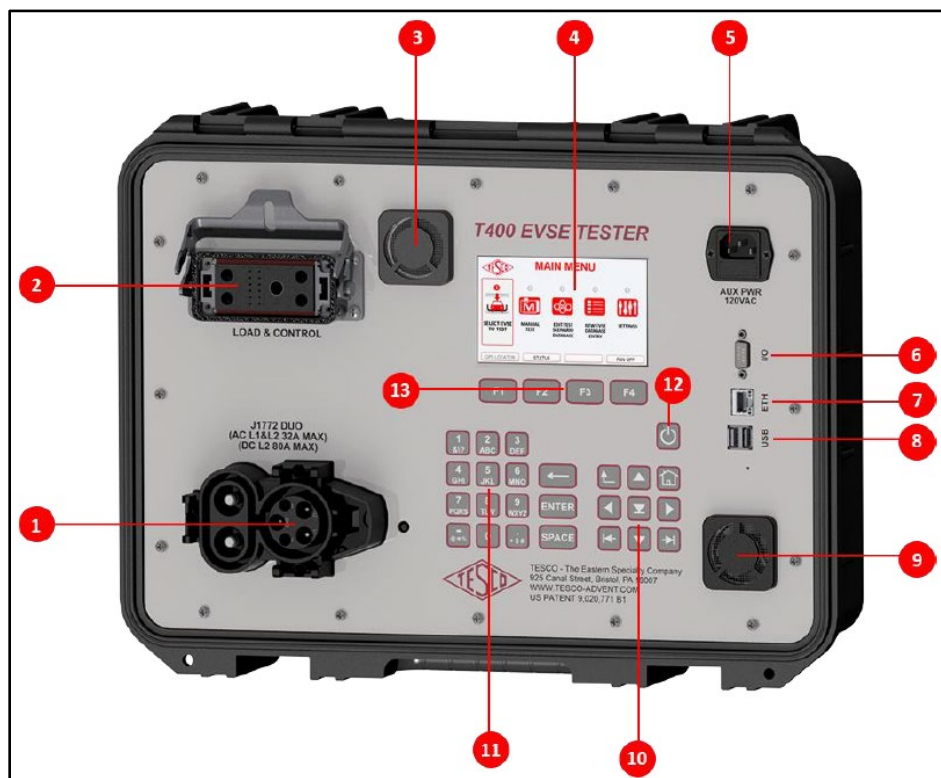


Figure 6 - EVSE Field Test Standard.

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NUMBER	DESCRIPTION
1	1772 Duo Connector – EVSE Coupler The EVSE Tester is capable of AC & DC Charging in compliance to J1772 standard.
2	Load And Control Connector – PLXXX Combitac The LOAD and CONTROL connector provide serial communications & power supply to PLXXX as well as the L1, L2, Protective GND, CP & PROX lines.
3	Inlet Fan
4	TFT LCD Screen. 5” 800x480, full color TFT LCD screen
5	Aux Power (120 VAC)
6	RS232 Com Port
7	Ethernet Com Port
8	2X USB Port
9	Exhaust Fan
10	Navigational Keypad
11	Alpha-Numeric Membrane Keypad
12	Power Button
13	Function Keys

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EVSE Standard – Set up

The Field Test Standard and EV Load Emulator are suitable for bench top use if there is enough space to allow adequate ventilation. The Instruments can be rack mounted as well. Please see suggested placement per setup.

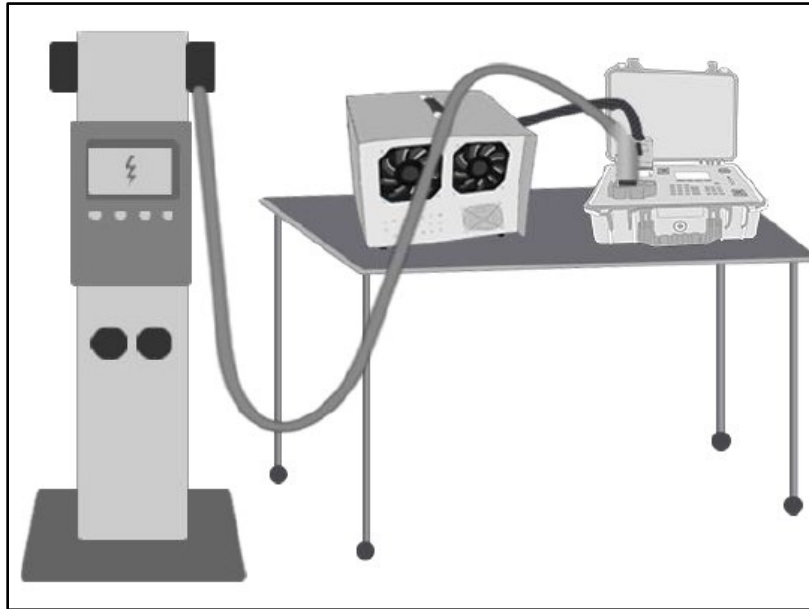


Figure 7 - Benchtop Mount Suggested Setup.

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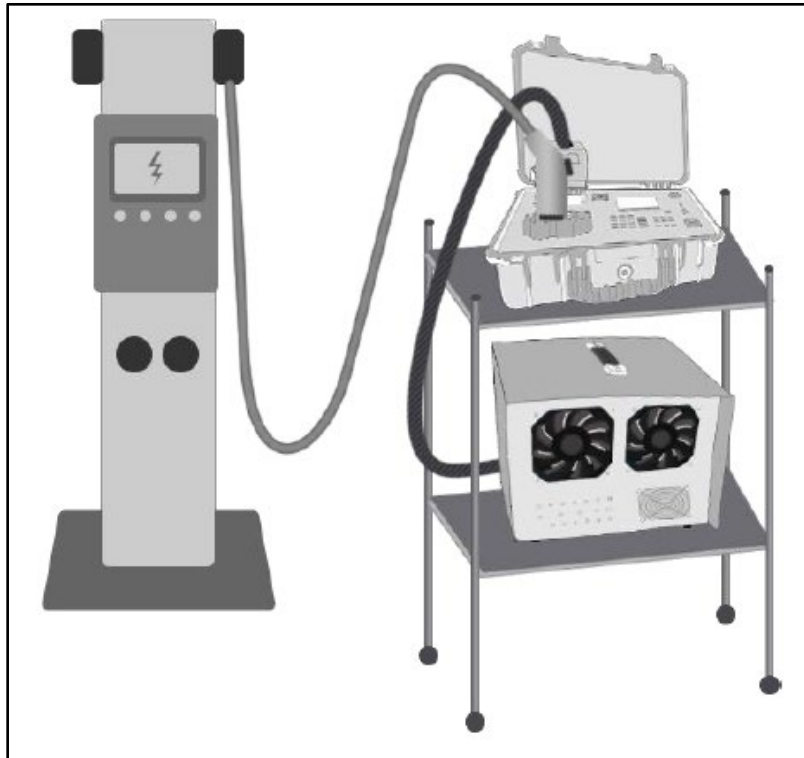


Figure 8 - Rack Mount Suggested Setup.

WARNING

Take Note of the Field Test Standard and EV Load Emulator airflow as seen in the illustration below. This is applicable for both bench top and rack-mounted.

The Field Test Standard and EV Load Emulator air outflow can be hot to extremely hot particularly when testing at higher load current or power. Please allow enough back space of at least 2 meters for the PLXXX air outflow.

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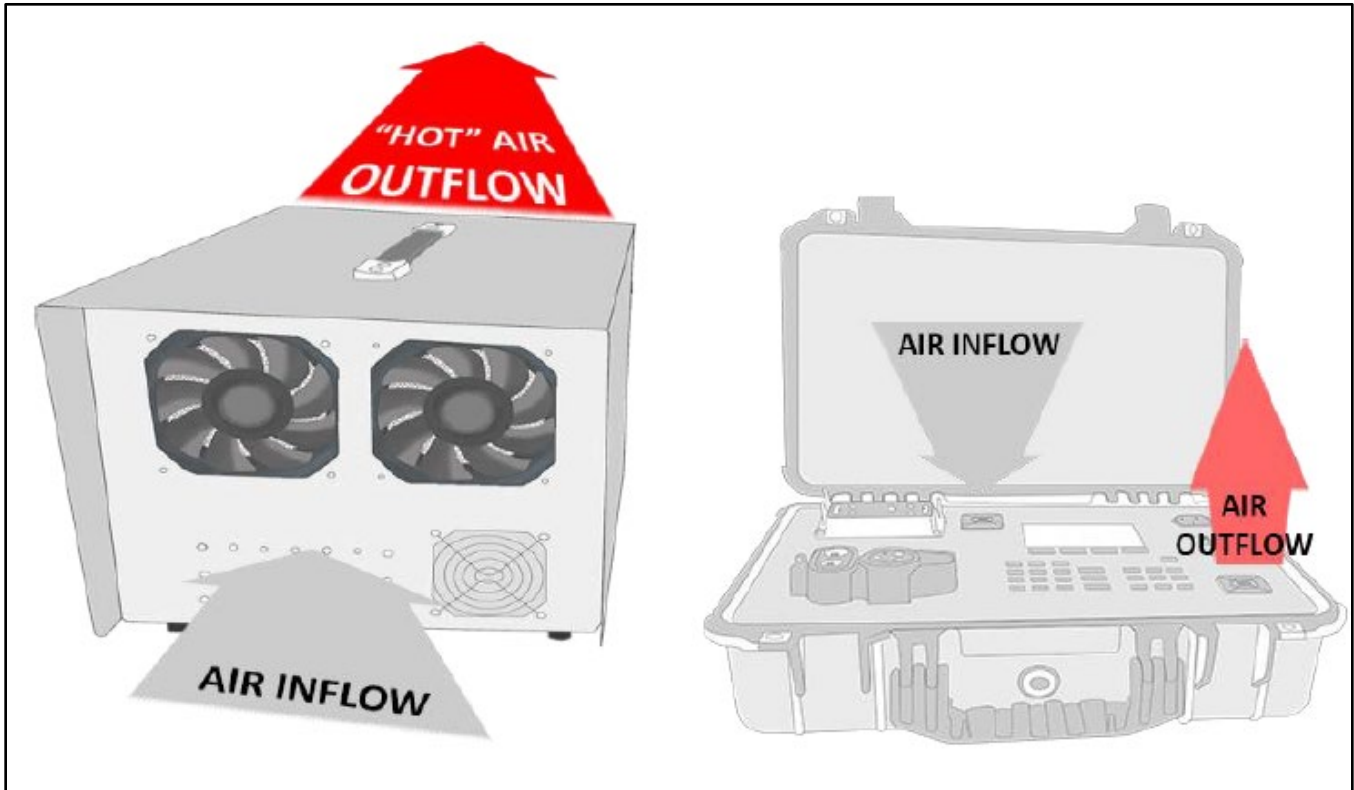


Figure 9 - Image of airflow on the Field Test Standard and EV Load Emulator air outflow.

NOTE: The inlet and exhaust holes must be clear of obstruction. The air entering the instrument must be between 41 °F (5 °C) and 95 °F (35 °C). Make sure that exhaust from another instrument is not directed into the fan inlet.

IMPORTANT: Check and clean the air filter every 30 days or more frequently if the Field Test Standard is operated in a dusty environment.

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Sequence of Connection and Power-Up

The Field Test Standard connector employs a “make first, break last” system where upon insertion, the ground connection is established first before making power connection and maintain ground until after power connections are broken. This system helps ensure a safer connection.

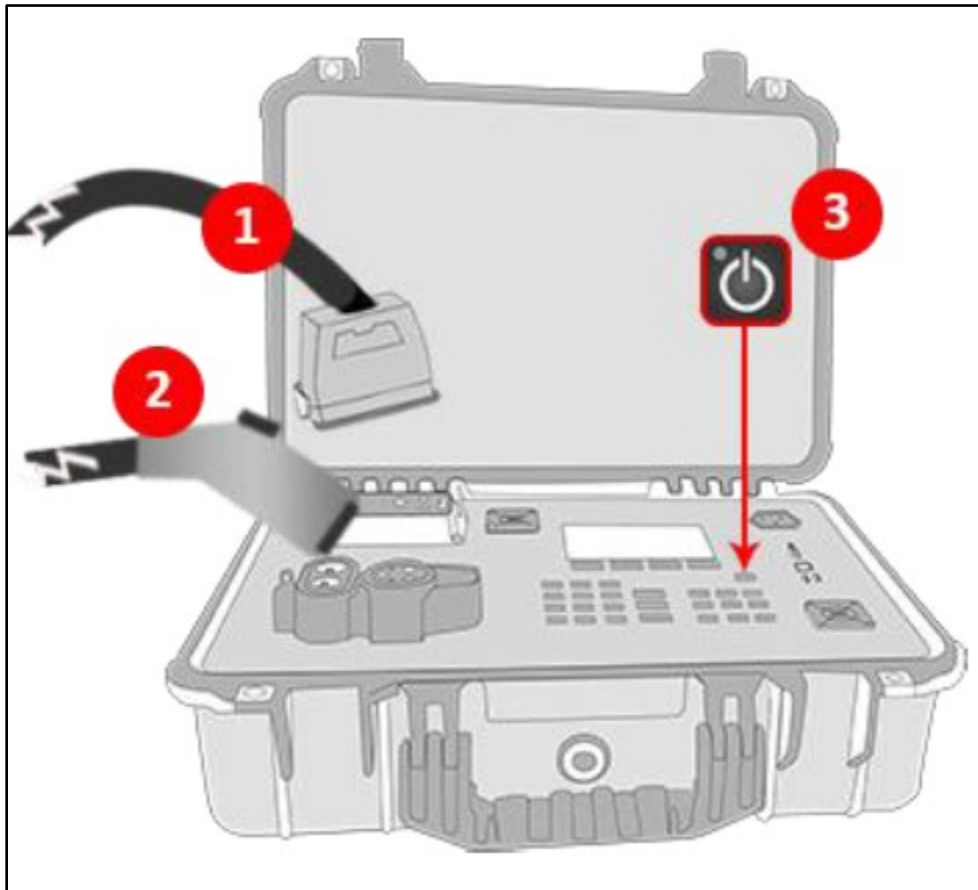


Figure 10 - Sequence of Connection and Power-Up.

1. Connect the COMBITAC of PLXXX to the LOAD & CONTROL connector of TXXX.
2. Connect the Coupler of EVSE to the J1772 DUO connector of TXXX
3. To Power ON, long press the POWER button for at least 2 seconds.

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EVSE Test Data Report						
<u>County</u>		<u>Registration No.</u>			<u>Date</u>	
<u>Establishment Name</u>			<input type="checkbox"/> Retail Store <input type="checkbox"/> Parking Garage <input type="checkbox"/> Restaurant <input type="checkbox"/> _____			
<u>Address</u>			<u>City</u>		<u>Zip Code</u>	
EVSE Make		EVSE Model			Type Approval Number	
EVSE S/N		EVSE ID No. (Ex: Dispenser #4)			MMQ	
Type of Rates <input type="checkbox"/> Fixed <input type="checkbox"/> Variable		Type of Energy Transfer <input type="checkbox"/> AC <input type="checkbox"/> DC			Fee <input type="checkbox"/> Energy <input type="checkbox"/> Time	
Voltage Rating (V) _____ Volts		Max. Current Deliverable (MDA) _____ Amps		Nominal Power Transfer (V x MDA) _____ kWh		
A	B	C	D	E	F	G
Test Type	Test Duration (sec)	Standard (kWh)	EVSE (kWh)	% Error [(D-C)/C] * 100	Pass/Fail	\$ Charge
Test Types: LL = Light Load, FL = Full Load Maintenance tolerance = 2%, Acceptance tolerance = 1%						
Acknowledged by				Inspector		