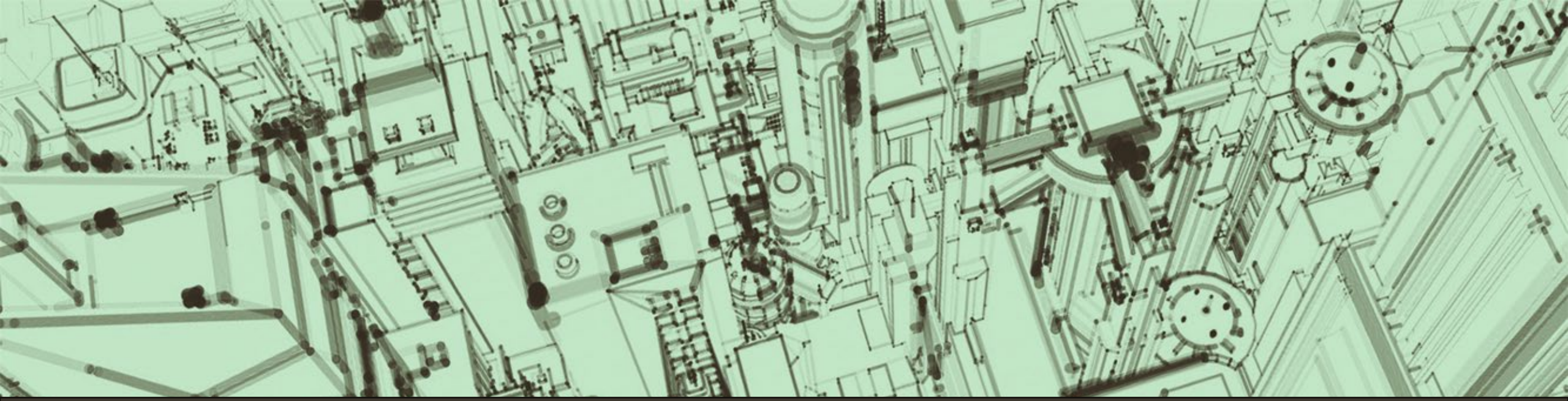

Field Testing EVSE

Challenges and Lessons Learned while Inspecting EVSE in the Field

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Division of Measurement Standards
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Objectives

This presentation is intended to cover the following topics:

- Current Landscape
- Helpful Tips
- Inspecting EVSE
  - Type Evaluation
  - Hardware Challenges
  - Software Challenges
- Challenges when Testing for Accuracy
- Field Testing Realities
- Questions

Current Landscape

- Testing of EVFS is increasingly difficult with the evolving landscape of both hardware and software.
- Load solutions must be determined prior to testing. (e.g. emulator vs vehicle as a load)
- Cost of Testing Equipment is high
- Mobile app integration with type approved and non approved devices
- Many manufacturers and service providers mistakenly believe that so long as the hardware has been approved, any software/app is acceptable.
- Megawatt Charging Systems (MCS) and “Smart Outlets”

Helpful Tips

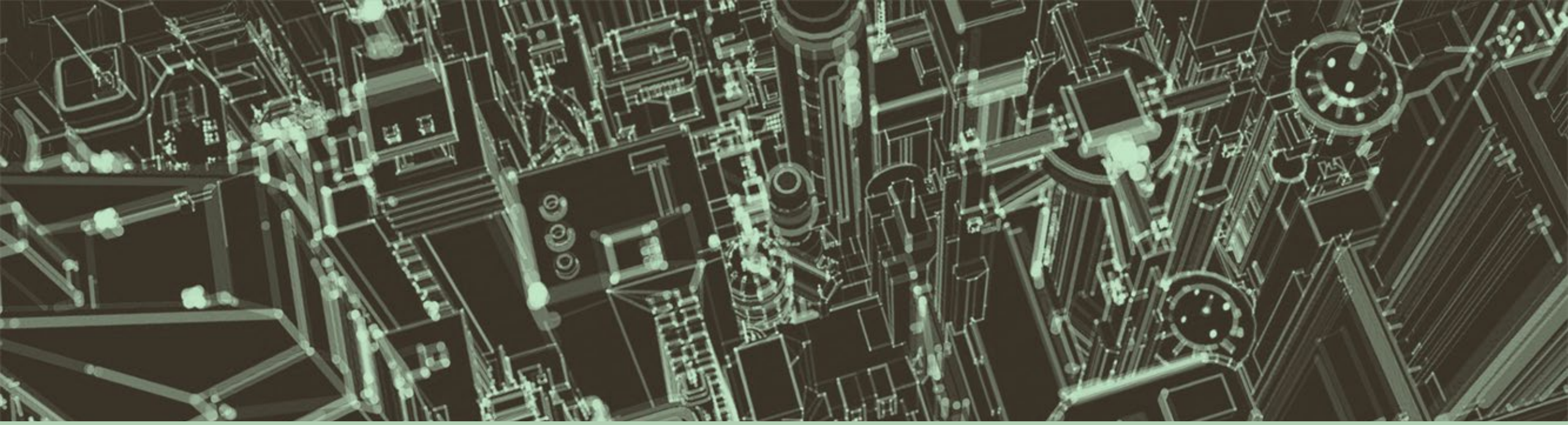
- ✓Take pictures of EVSE including markings, badging, various screens, and other auxiliary elements (kiosks, apps, etc.)
- ✓Conduct a survey of devices prior to bringing equipment to test for accuracy
  - Make initial contact with owner of device
  - Check if device is being used for commercial purposes and is type evaluated or not
  - Check to see when the device was installed and placed into service. Is it exempt or not?
- ✓Inspect Specifications such as markings, pricing, activation methods, RSA requirements etc.
- ✓Ensure testing solution is appropriate for the site (e.g. will a large emulator fit into wherever the devices are located)

Helpful Tips

- ✓Be prepared for various activation methods
  - Payment method for each type
- ✓Keep a copy of type evaluation certificates in a digital folder
  - Printing and keeping a physical copy can be an option
  - Many devices are being updated and receiving amended certificates
- ✓California Tip – Check if app/software has a separate certificate of approval
- ✓Take pictures of device including markings, badging, various screens, and other auxiliary elements (kiosks, apps, etc.)

Examples of AC EVSE

Examples of DC EVSE



Inspecting EV Devices

Type Evaluation

- In California, all devices used for commercial purposes as defined by BPC § 12500(e) are required to be 'type approved' meaning that the device has:

- A Certificate of Approval (COA) issued by the California Type Evaluation Program (CTEP) which is administered by CDFA-DMS. [https://www.cdfa.ca.gov/dms/programs/ctep/ctep.html].

  or

- A Certificate of Conformance (CC) issued by the National Type Evaluation Program (NTEP) which is administered by NCWM. [https://www.ncwm.net/ntep/cert_search]

BPC § 12500.5 (this requirement has been in effect since 1949)

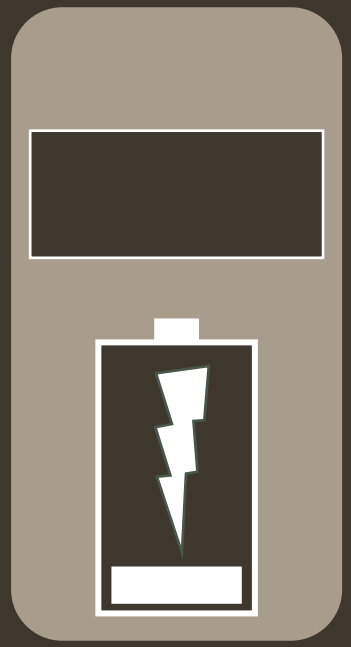
Hardware Challenges

- When was it installed/placed into service?
  - AC vs DC have different requirements if installed prior to 1/1/2021 for AC and 1/1/2023 for DC
  - *In California
- Is it type evaluated?
- Does it match the type evaluation certificate?
- Was it placed into service by a registered service agent?
- Is it an AC or DC device?
- Is it being used for commercial purposes?
- Am I using a load emulator or vehicle as a load
- Is it within tolerance?
- Does it have all the required markings according to HB 44 Section 1.10 and 3.40?
- What are the activation methods?

EXAMPLE:

Devices marked with model(s) that do not match approval or software version numbers that do not match the approval.

Additionally – devices not marked with MMQ or required prefixes, etc.



Manufacturer: Company A

Model: 123

Software version: XXX.XXX.XXX.XXX

Manufacturer: Company A

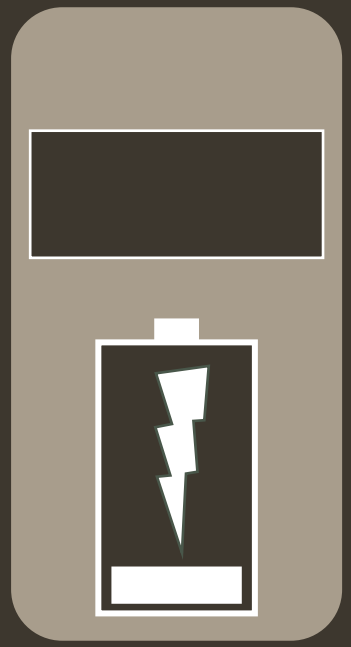
Model: 123-ABC (or “456”)

Software version: YYY.YYY.YYY.YYY

EXAMPLE:

Devices marked with manufacturer or distributor information not listed on the type evaluation.

[A DBA or subsidiary for instance.]



Manufacturer: Company A

Model: 123

Software version: XXX.XXX.XXX.XXX

Manufacturer: Company B

Model: 123

Software version: XXX.XXX.XXX.XXX

EXAMPLE:

Devices being white labeled.

(i.e. “Company A” holds a valid type evaluation, but the device is labeled with “Company B” information).

Manufacturer: Company A

Model: 123

Software version: XXX.XXX.XXX.XXX

Manufacturer: Company B

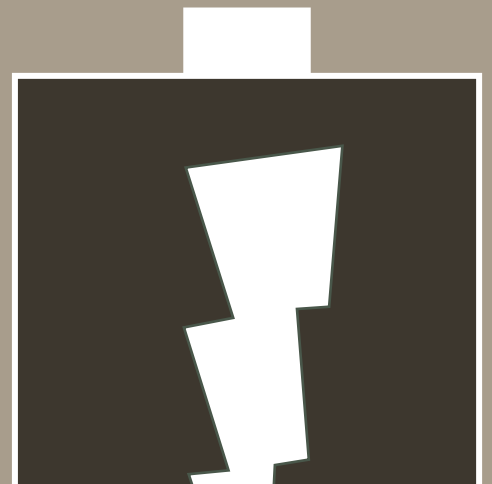
Model: 456

Software version: YYY.YYY.YYY.YYY

EXAMPLE:

Devices configured to sell energy by time instead of kWh.

Energy Rate: $2.50/hr



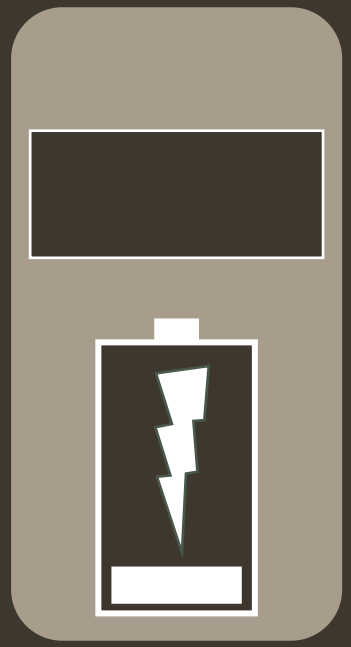
Example of Broken Equipment

Software Challenges

- Is the software type evaluated with the hardware or by itself?
- Does it match the type evaluation certificate?
- Does it have all the required markings according to HB 44 Section 1.10 and 3.40?
- What are the activation methods?
- What is the process of receiving the recorded representation?
- Does the software version match with what was approved in the type evaluation certificate?

EXAMPLE:

Devices configured to activate or provide recorded representations in a way different than approved.



Operation: To start a session, the customer must use the payment card reader and will be prompted to enter a telephone number to receive a session receipt.

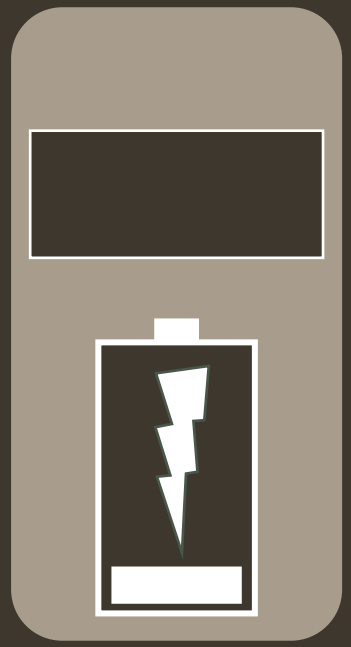
Marked on the device:

To start a session, log in to the “Company A” app and scan the QR code.

At the end of the session the recorded representation is provided through the app.

EXAMPLE:

Devices configured to operate with an app not listed on the type evaluation.



Operation: To start a session, the customer may initiate the transaction through “Company A” app or the payment terminal.

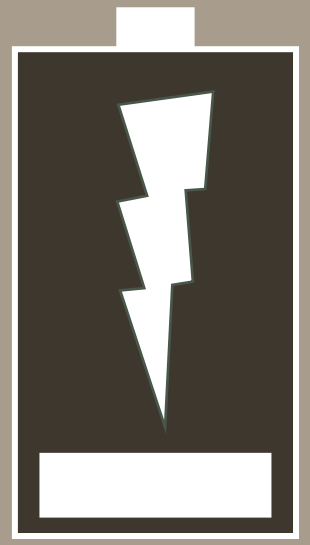
Marked on the device:

To start a session, log in to the “Company B” app.

EXAMPLE:

Recorded representations not matching the indication.

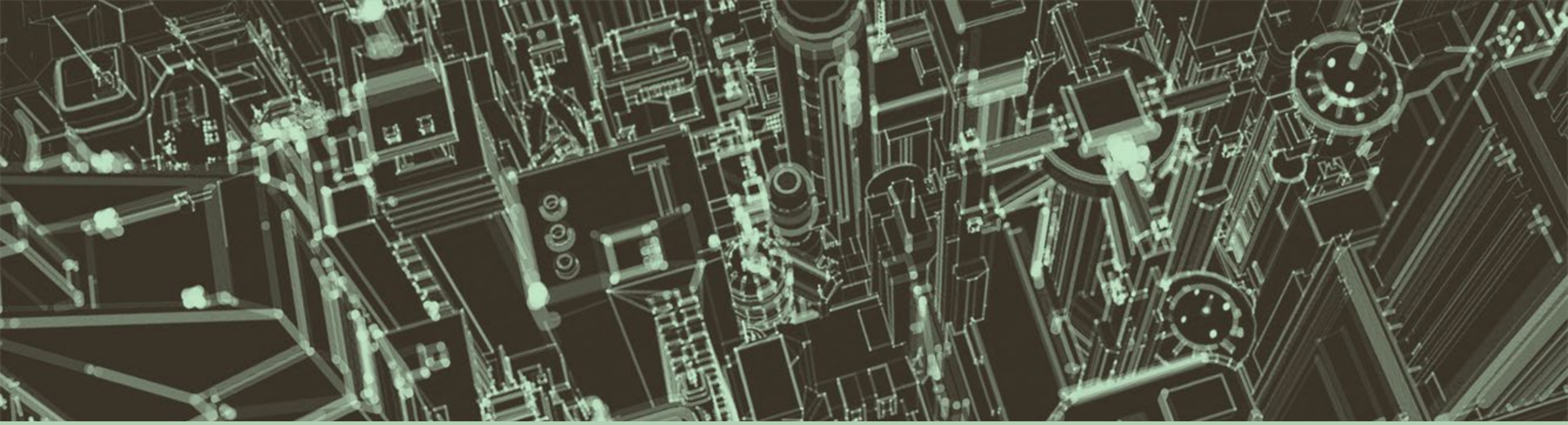
4.543 kWh



Energy delivered:
4.55 kWh

Or

Energy delivered:
4.998 kWh



Challenges when Testing for Accuracy

Equipment in the Field

Common Issues

AGREEMENT IN INDICATIONS

ACTIVATION METHODS

REQUIRED MARKINGS

RECORDED REPRESENTATIONS

TOTALIZER VALUES

COMMUNICATION ERRORS BETWEEN THE STANDARD AND EVFS

Other challenges during accuracy testing are:

- Various activation methods: Credit card, RFID, mobile application, toll free telephone support.
- Software functionality: Evaluating the display or “face” of the device.
- Receipt process: How to retrieve a receipt from each activation method.
- 
  Examine totalizer value and audit trail.

Tolerances in California

Table T.2.

Accuracy Classes and Tolerances for EVSE

Accuracy Class	*Application or Commodity Being Measured*	*Acceptance Tolerance*	*Maintenance Tolerance*
2.0	AC electricity as a vehicle fuel	1.0 %	2.0 %
5.0[1]	DC electricity as a vehicle fuel	2.5 %	5.0 %
2.0[2]	DC electricity as a vehicle fuel	1.0 %	2.0 %

Note: Figures displayed are accurate as of January 1, 2026

Tolerances in HB 44 Section 3.40

T.2. Accuracy Test Tolerances.

T.2.1. EVSE Accuracy Test Tolerances for AC Systems. – The tolerances for EVSE load tests for AC Systems are:

(a) Acceptance Tolerance: 1.0 %; and

(b) Maintenance Tolerance: 2.0 %.

(Amended 2022 and 2024)

T.2.2. EVSE Accuracy Test Tolerances for DC Systems. – The tolerances for EVSE load tests for DC systems shall be as follows:

(a) For a DC system that was placed in service prior to January 1, 2025, and that is marked Class 5, acceptance and maintenance tolerances are: 5.0 %. This paragraph T.2.2.(a) shall expire on January 1, 2034; after that date, all DC EVSEs shall be subject to the tolerances of paragraph T.2.2.(b).

(b) For any DC system not subject to paragraph T.2.2.(a), tolerances are:

(1) Acceptance Tolerance: 1.0 %; and

(2) Maintenance Tolerance: 2.0 %.

(Added 2024)

All DC EVSE placed into service prior to January 1, 2025 are exempt from this requirement until January 1, 2028.

Field Testing Realities

- Many new devices are unapproved or approved devices do not match the type evaluation certificate
- Devices that have been type evaluated are being sold and different software or new functionality is being added after type evaluation
- Many devices are not placed into service by a Registered Service Agent (RSA)
- Many devices are fixed or worked on by someone who is not a licensed RSA
- Many devices are missing required markings
- Devices are damaged or not maintained properly
- Owners of EVSE may not be educated on Weights and Measures laws and regulations

Questions?

Thank you, NCWM!

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