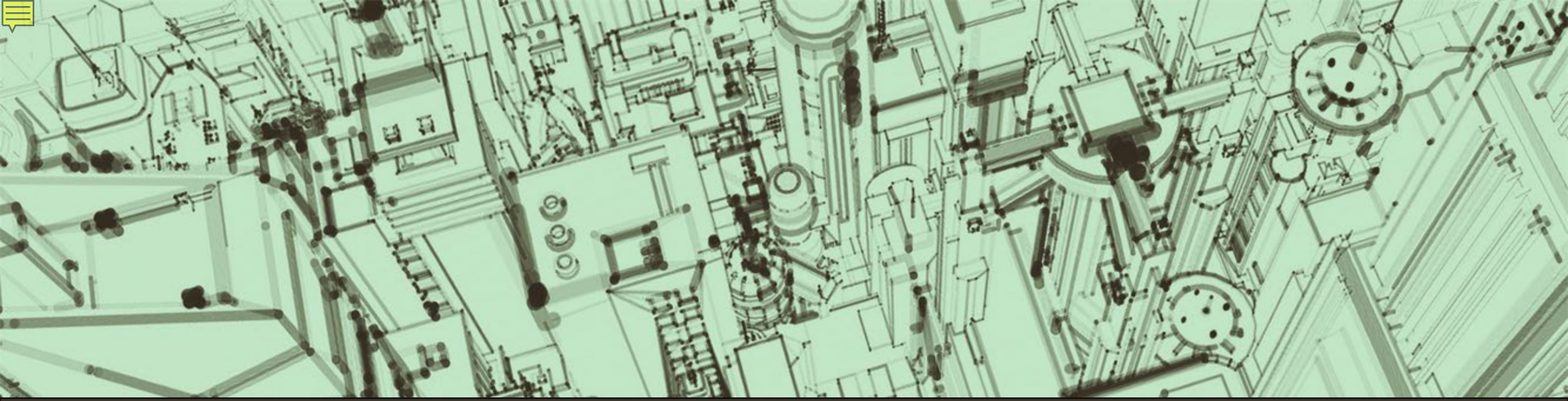


EVSE – What to Expect

Challenges and Lessons Learned while Inspecting EVSE in the Field

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California Department of Food and Agriculture
Division of Measurement Standards
Supervising Special Investigator – Jeremy Epley



Housekeeping

- Thank you to our hosts
- Restrooms
- In Case of Emergency
- Breaks
- Courtesy

Your Department Policies Are Your Department Policies

- Please **consult your chain of command** before implementing actions which might conflict or raise concerns per your Department Policy.

- None of the items discussed in this training are intended to supersede your Department Policies or chain of command.

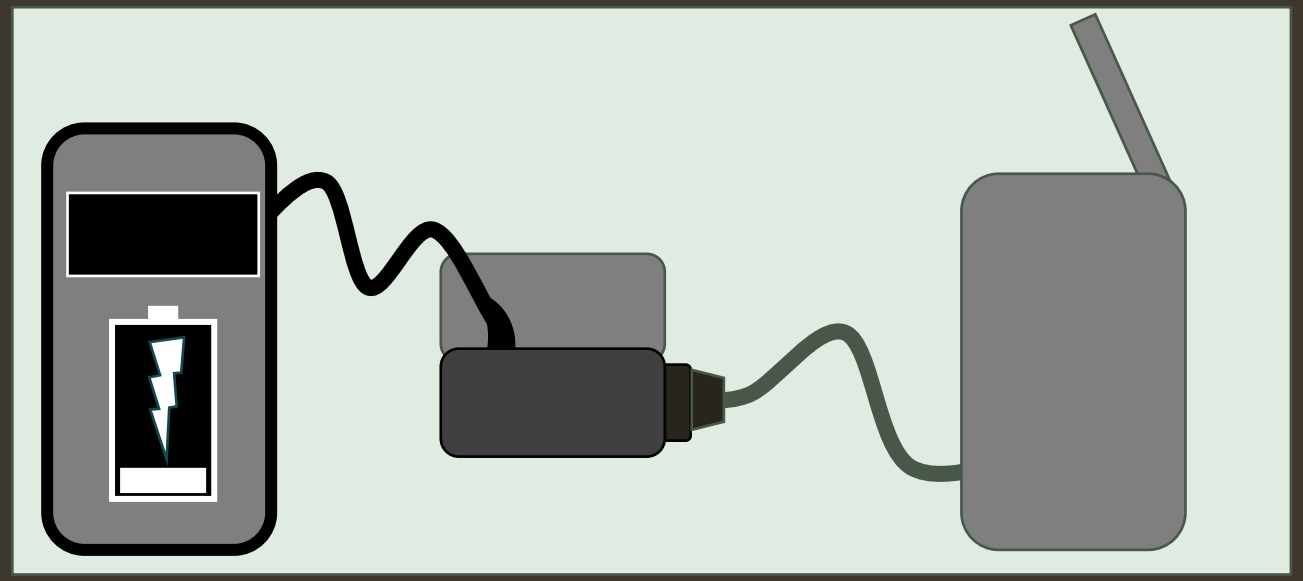
Objectives

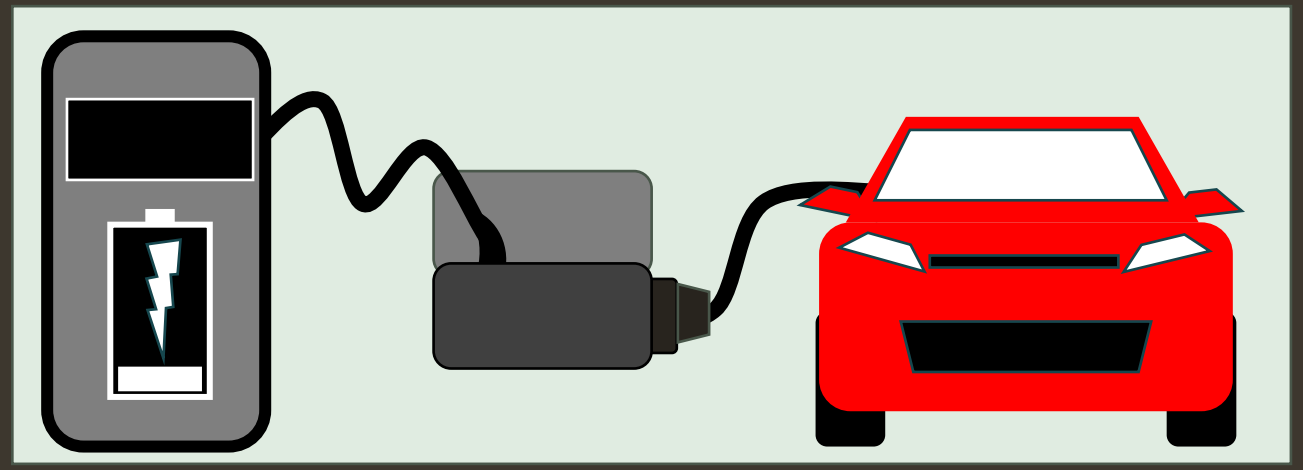
This presentation is intended to cover the following topics:

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

Current Landscape

- Load solutions must be determined prior to testing. (e.g. emulator vs vehicle as a load)
- Cost of testing equipment is high
- Accessibility of EVSE
- Megawatt Charging Systems (MCS) & other emerging technologies





Helpful Tips

Take pictures of EVSE including markings, badging, various screens, and other auxiliary elements (kiosks, apps, etc.)



Helpful Tips

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?



Helpful Tips

- ✓ Inspect Specifications such as markings, pricing, & activation methods.
- ✓ Check for registered service personnel requirements etc.
- ✓ Ensure testing solution is appropriate for the site (e.g. will a large emulator fit into wherever the devices are located)

Company A

Model: XXXXXXX
SN: XXXXXXXX
MMQ: X.X kWh
Max Current XXVAC

$X.XX/kWh

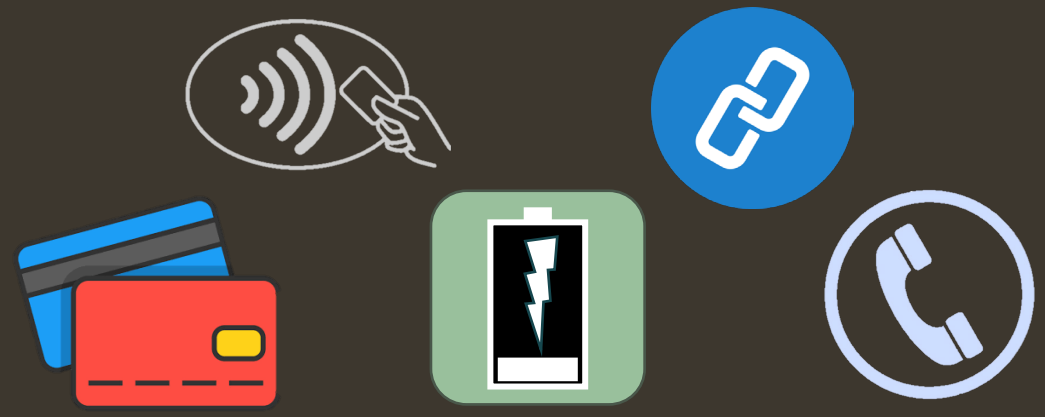


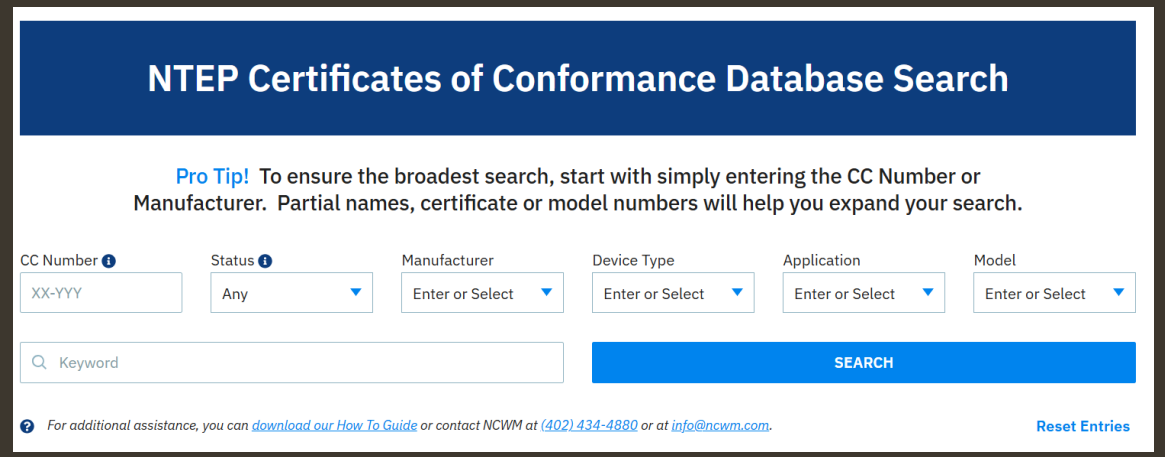
Serviced By: XXXXXX
Date: XX/XX/XXX
Reg. #: XXXXX



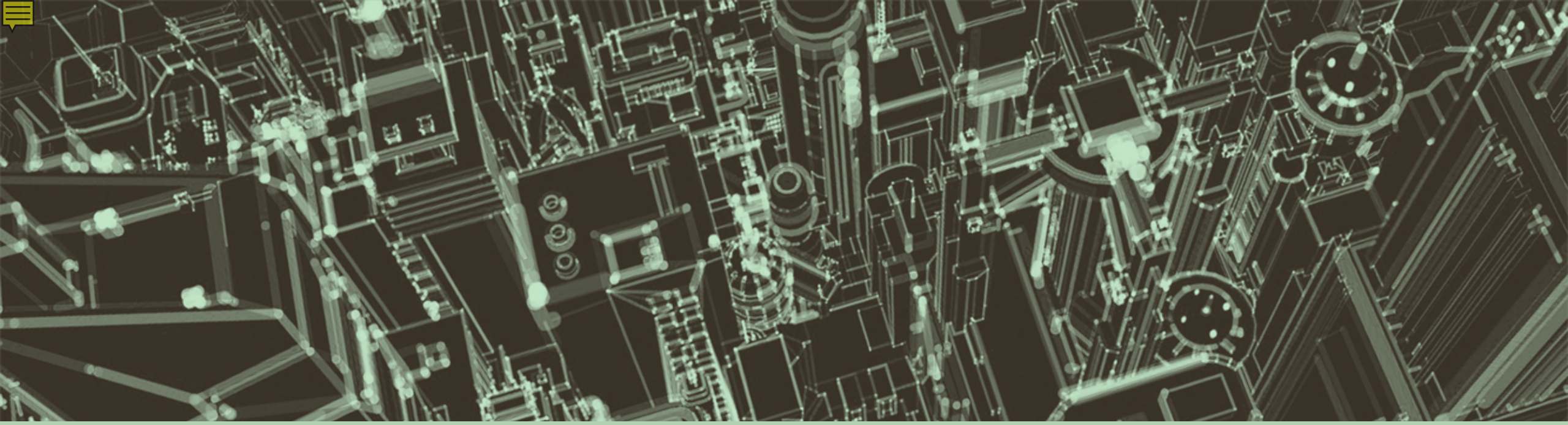
Helpful Tips

- ✓ Be prepared for various activation methods
  - Payment method for each type of activation.
- ✓ Access to type evaluation certificates is very important
  - Many devices are being updated frequently and receiving amended certificates.





https://www.ncwm.com/ntep-certificates



Inspecting EVSE

Examples of AC EVSE





Examples of DC EVSE







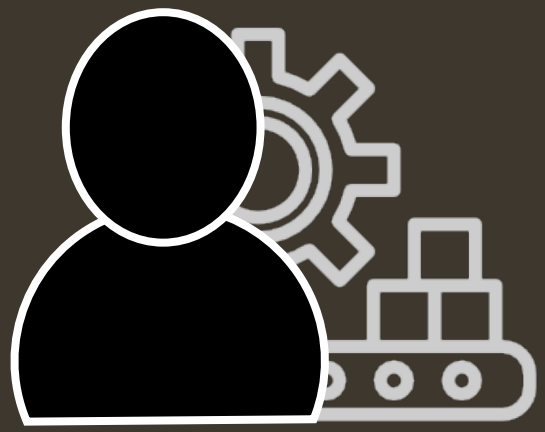
Type Evaluation



- Type evaluation is the examination of weighing or measuring devices for the purpose of certifying that their design and performance complies with NIST Handbook 44 Specifications, Tolerances, and Other Technical Requirements.
- It ensures that the manufacturer of the device, the user, and the consumer have confidence that the device complies with weights and measures laws.

Manufacturer's Responsibilities

EVSE Manufacturer



- The manufacturer of the device is responsible for keeping up with changes to NIST Handbook 44.
  - It is the manufacturer's responsibility to ensure that their devices are manufactured to meet applicable requirements and to match the applicable type evaluation certificate.
- If a model designation has changed, or significant changes are made to the design of a device covered by a type approval – it is the manufacturer's responsibility to ensure that the type approval is updated to reflect those changes.

Type Evaluation Certificates Identify:



- Manufacturer/Distributor Information
- Model Designations
- MMQ & Maximum Amperage Information
- Software Version Numbers
- How to Activate the Device
- How to receive Recorded Representations
- How to access:
  - Identification information,
  - Totalizer values, and
  - Sealing provisions

Questions to ask when preparing to inspect EVSE

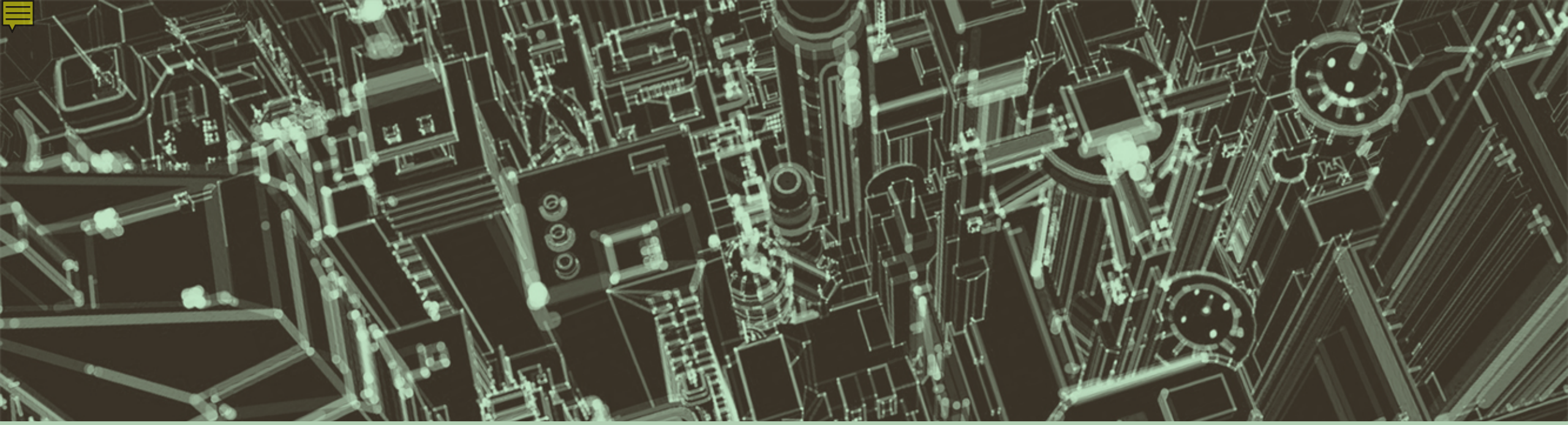


- When was it installed/placed into service?
  - AC vs DC have different requirements based on when it was placed in service.
  - Is it an AC or DC device?
- Is it type evaluated?
- Does it **match** the type evaluation certificate?
- Was it placed into service by a registered service agent?
- Can I access the Device?

Questions to ask (continued)



- Is it being used for commercial purposes?
- Does it have all the required markings according to HB 44 Section 1.10 and 3.40?
- What are the activation methods?
- Am I using a load emulator or vehicle as a load?
- Is it performing within the tolerance?
- How will I access the recorded representation?



Hardware Challenges Examples

EXAMPLE:

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

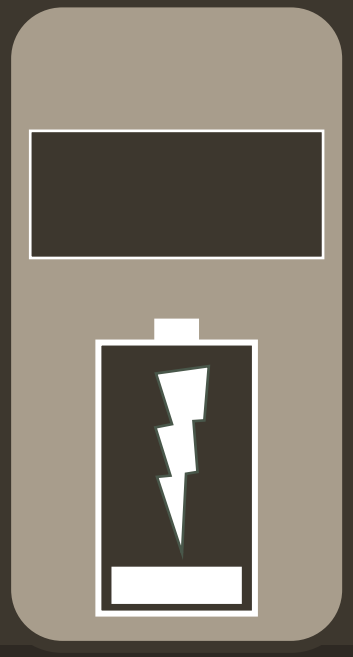
Additionally – devices not marked with MMQ or required prefixes, etc.



Manufacturer: Company A

Model: 123

Software version: XXX.XXX.XXX.XXX



Manufacturer: Company A

Model: 123-ABC (or “456”)

Software version: yYY-Y.YYY-YY

EXAMPLE:

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

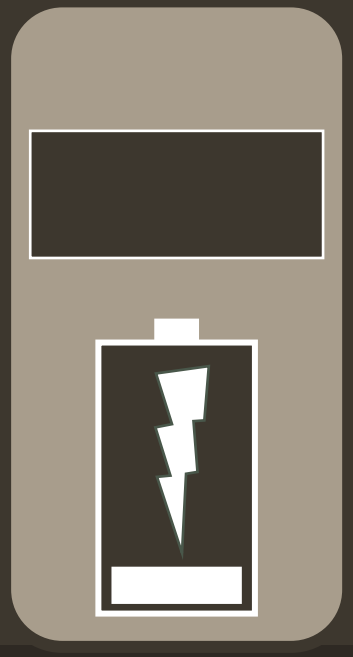
[A DBA or subsidiary for instance.]



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”.

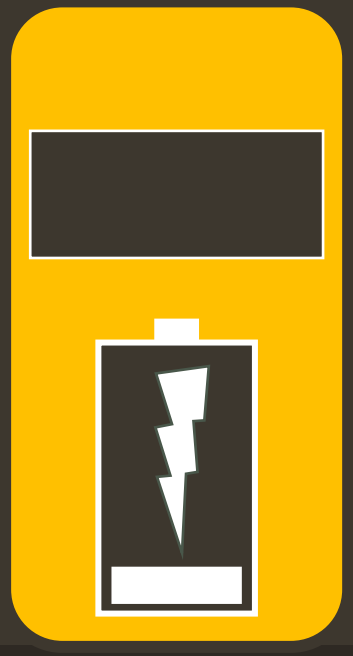
(i.e. “Company A” holds a valid type evaluation, but the device is labeled with “Company B” information).



Manufacturer: Company A

Model: 123

Software version: XXX.XXX.XXX.XXX



Manufacturer: Company B

Model: 456

Software version: yYY-Y.YYY-YY

EXAMPLE:

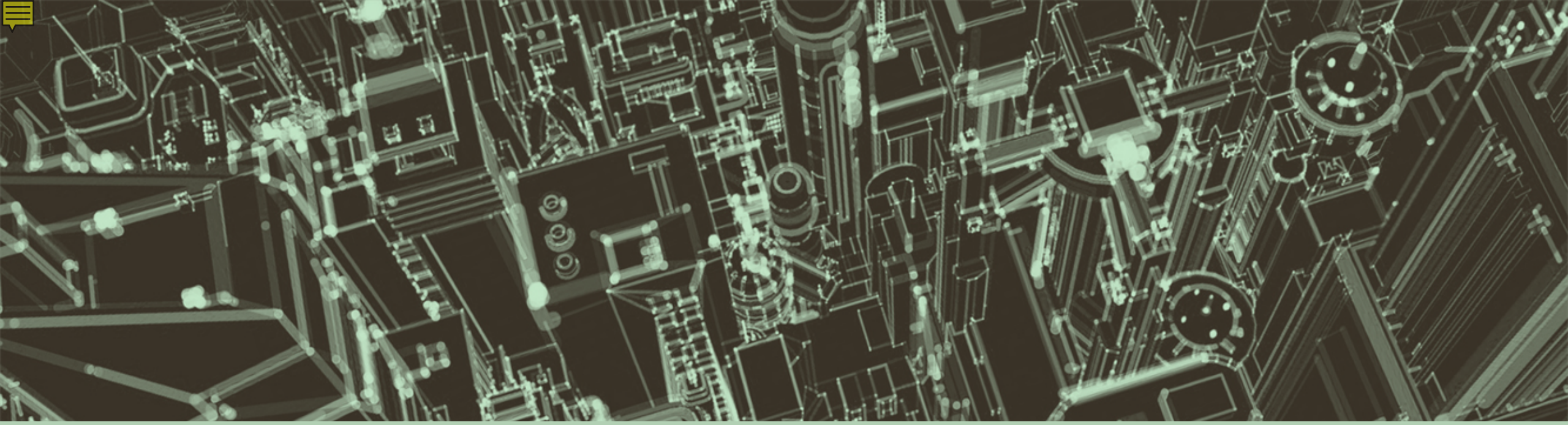
Devices configured to sell energy by time instead of kWh.

Energy Rate: $2.50/hr



Example of Broken Equipment





Software Challenges Examples

EVSE Communication

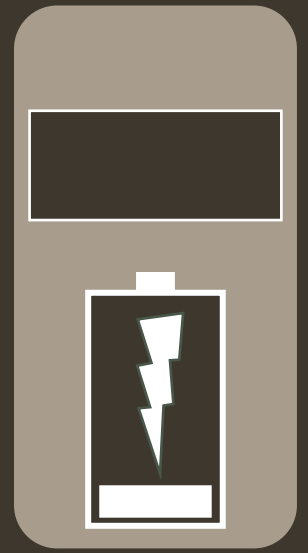
Electric Vehicle

EVSE

Communication protocol updates may require software/firmware updates for testing equipment.







Some EVSE use proprietary communication protocols.

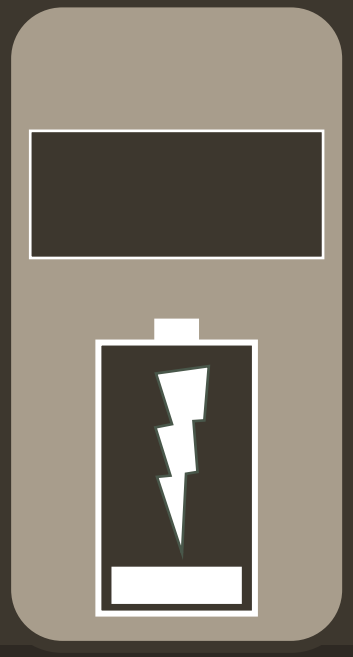
Frontend Communication

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.

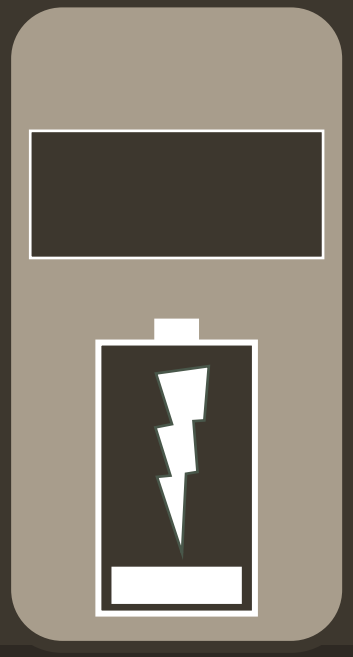
At the end of the session the recorded representation is provided through the app.

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.



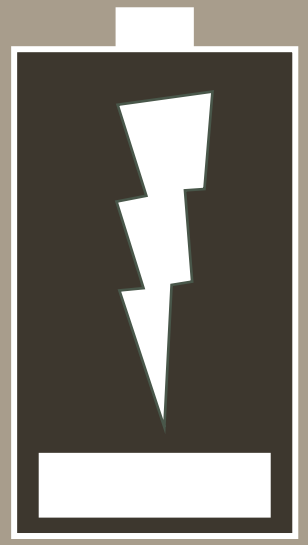
Marked on the device:

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

EXAMPLE:

Recorded representations not matching the indication.

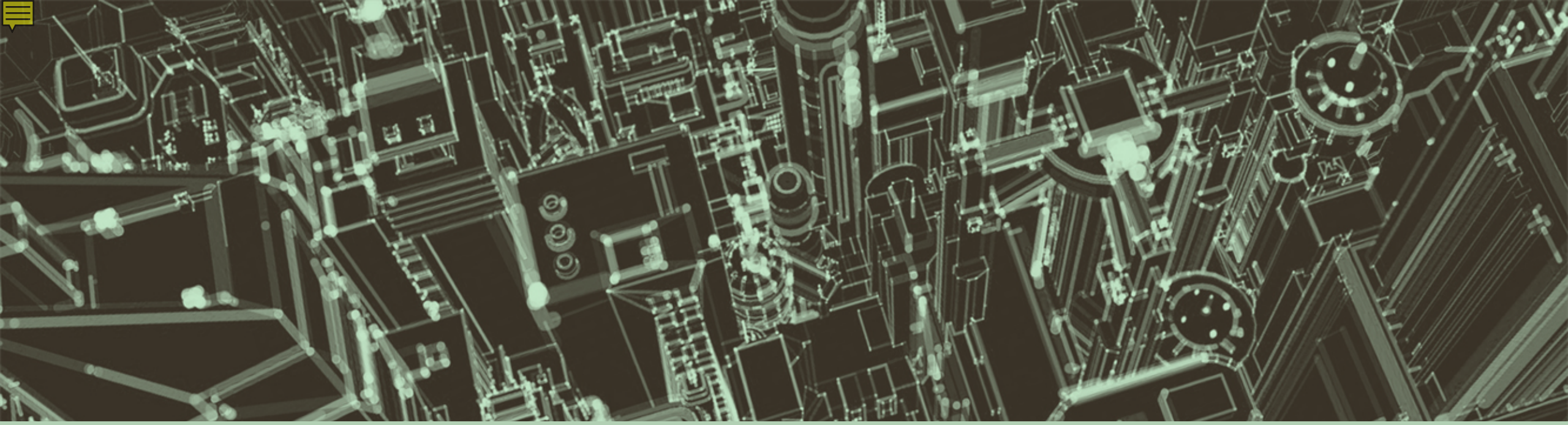
4.5437 kWh



Energy delivered:
4.55 kWh

Or

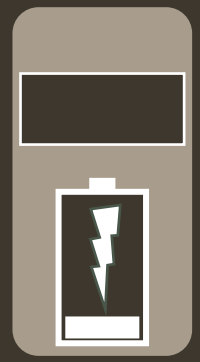
Energy delivered:
4.9983 kWh



Challenges when Inspecting/Testing

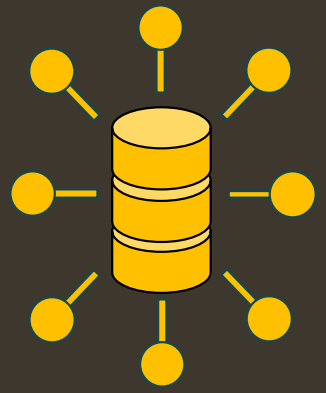
Agreement in Indications

Because charging session information is potentially forwarded multiple times, the information is susceptible to rounding, truncation, omission, etc.

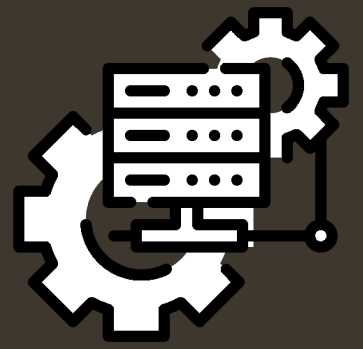




Backend Management System



Hub



Customer Management System

Backend Communication

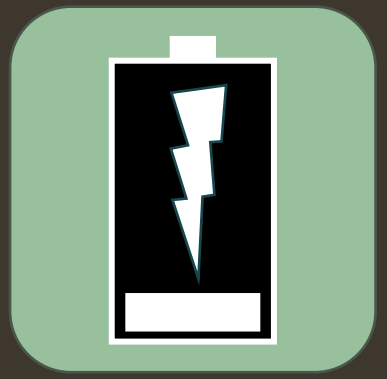
Various Methods of Payment/Activation



Credit Card



RFID



Mobile App



Web-Based App/URL



Telephone Support

Check the “Standard Features & Options” and “Operation” sections of the type evaluation certificate.

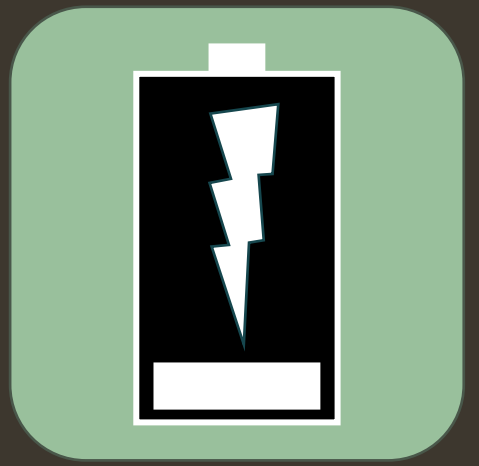
Various Methods of Receiving Recorded Representations



Email



Text Message



Mobile App

Check the “Operation” section of the type evaluation certificate.

Category 3 Event Loggers & Totalizers



User Interface



Email



Website (URL)

Check the “Identification’ & “Sealing” section of the type evaluation certificate.

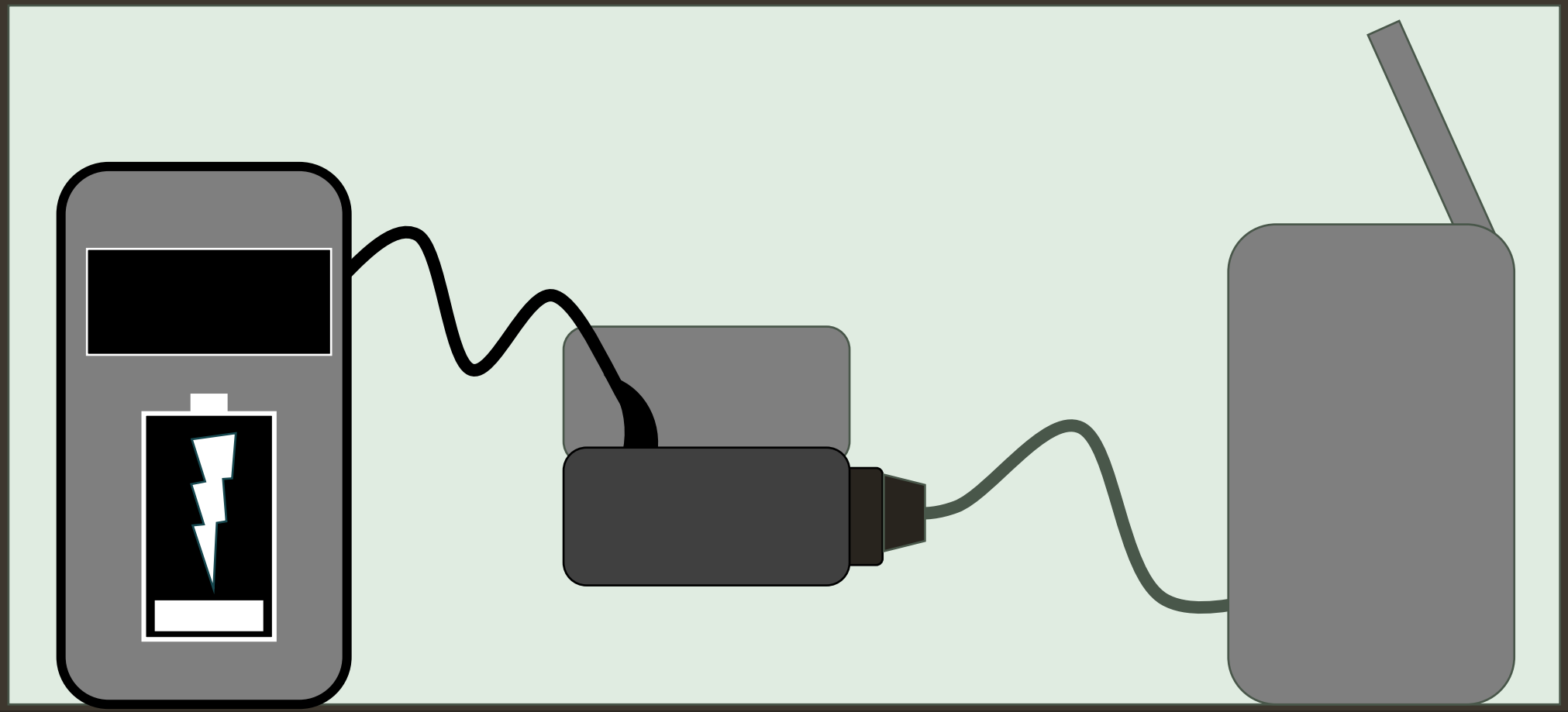
Equipment in the Field



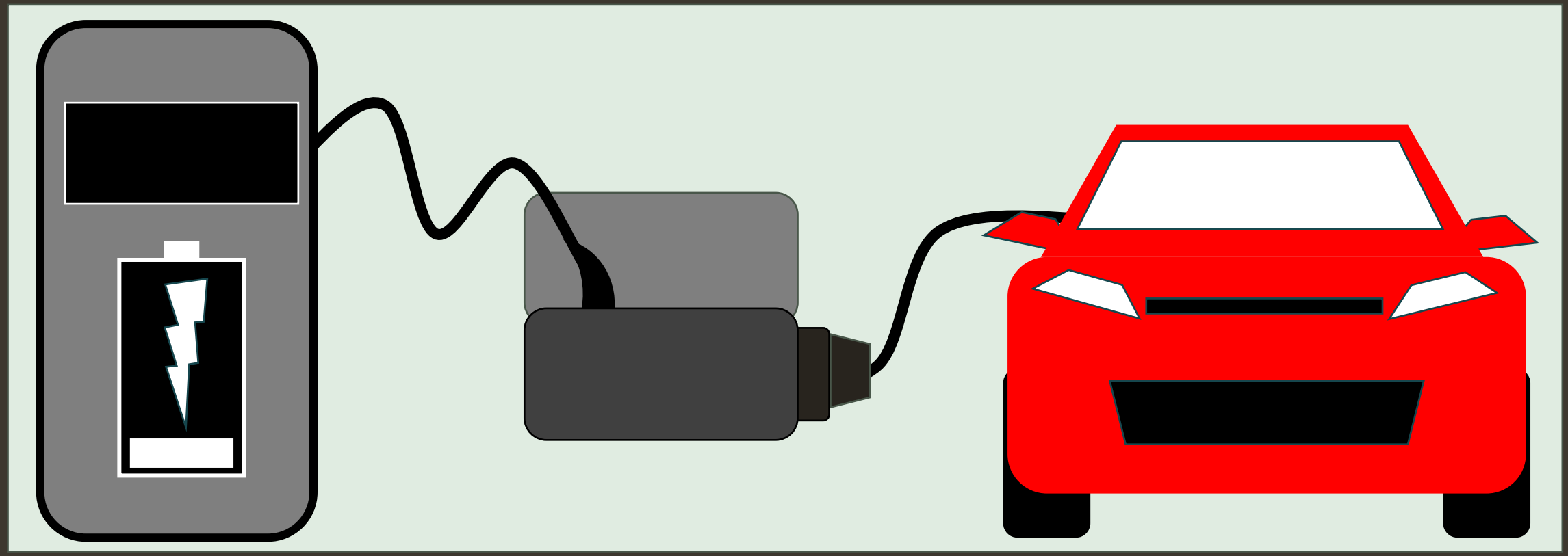


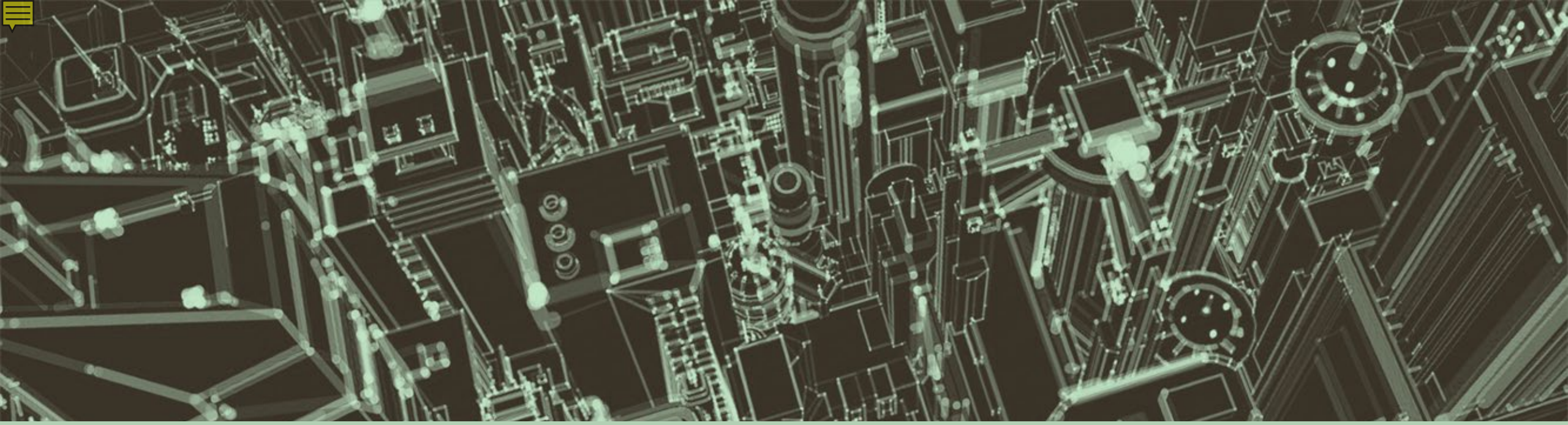


When **testing with an emulator**, the standard controls the parameters of the test and the emulator replicates the Control Pilot and Proximity Pilot signals – demanding a specific load at a controlled amperage.



When **testing with a vehicle as a load**, the vehicle communicates directly with the EVSE as though the standard is not present – the standard measures the energy delivered by the EVSE to the vehicle.





Witness Testing in the Field



Service Personnel Programs

- Allow businesses to use their devices commercially after installation and/or repair, pending official inspection from the Weights & Measures office.
- Promotes fair competition between agencies.
- Notifies Weights & Measures office of newly installed or repaired devices.
- Provides assurance that commercial devices have been installed and/or repaired in accordance with applicable requirements including but not limited to:
  - Type Approval
  - Specifications & Tolerances
  - Manufacturer instructions

Service Personnel Programs

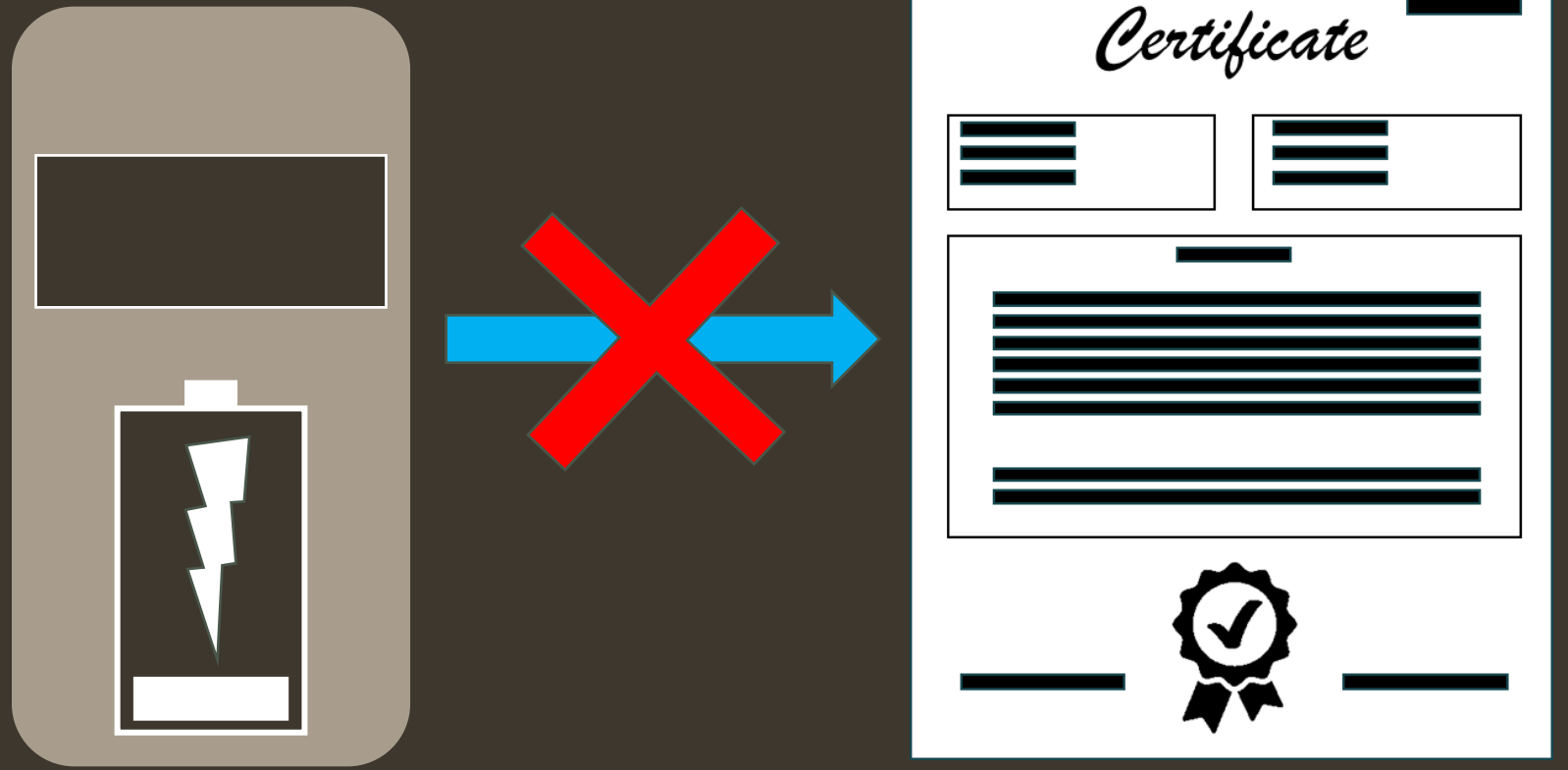
Registered service personnel have:

- Specialized technical knowledge about the devices they work on which can help Weights & Measure officials throughout the course of carrying out their duties.
- Specialized equipment which may expedite official inspections.



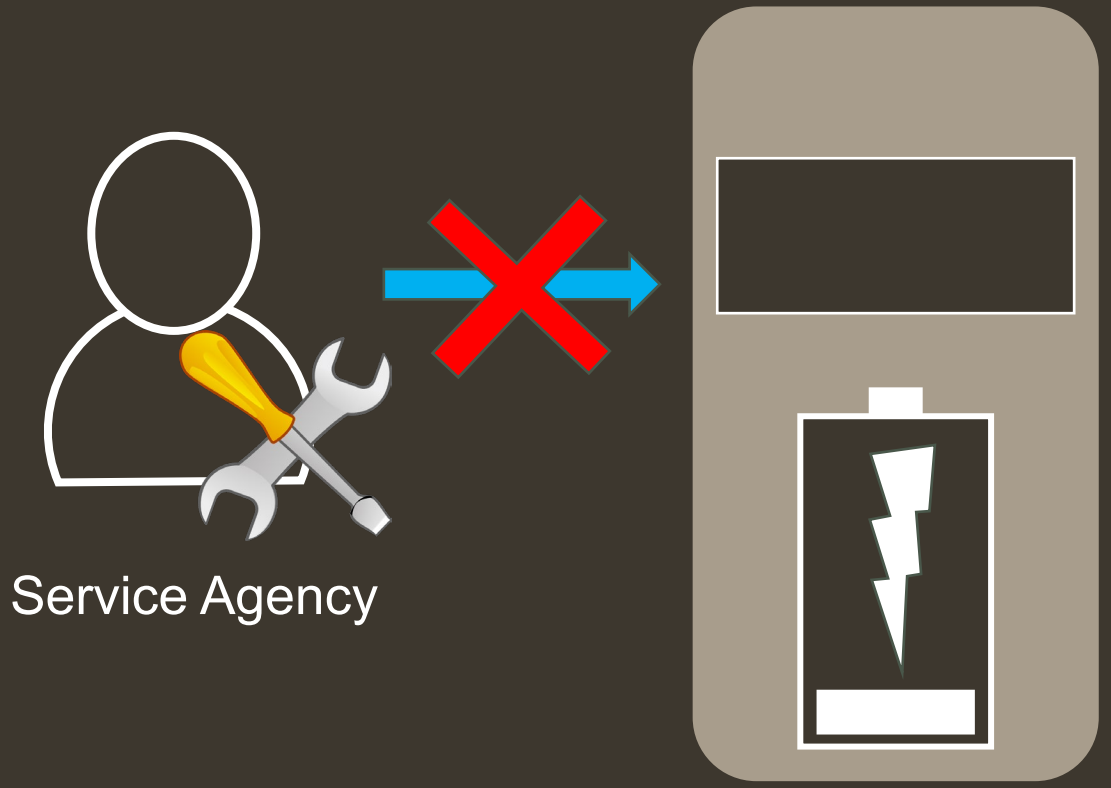
Field Testing Realities

- 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



Field Testing Realities

- 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!

Matthew Douglas
Supervising Special Investigator
Device Enforcement
(714) 904 - 5309
Matthew.Douglas@cdfa.ca.gov

Jeremy Epley
Supervising Special Investigator
Weighmaster Enforcement
(714) 293 - 5187
Jeremy.Epley@cdfa.ca.gov

For more information about our programs, please visit:
https://www.cdfa.ca.gov/dms