

## **Module: 8.3**

### **Electric Vehicle Fueling Systems**

#### **Overview and Scope**

This module sets standards for basic inspection and testing of Electric Vehicle Fueling Systems. The module is geared toward specific concepts related to device technology, operations, and specific inspection requirements and test procedures for these devices. The module focuses on specific concepts related to device technology, operations, specific inspection requirements, and test procedures for these devices found in NIST Handbook 44 General Code, Electric Vehicle Fueling Systems, Timing Devices and, NIST EPO 30.

#### **Prerequisites**

4.2 NIST Handbook 44 - Introduction to Device Control

#### **Learning Objectives**

##### **1 Technology, Terminology and General Requirements Used in EV Fueling Systems**

A weights and measures professional should understand the terminology and technologies used in EV Fueling Systems and integrated time-measuring devices. To demonstrate this the professional can:

- 1.1 Define common EV Fueling System and time measuring device terms such as ampere, creep, current, minimum measured quantity, volt, watt, watthour, and timing device.
- 1.2 Describe the major components of Electric Vehicle Supply Equipment (EVSE).
- 1.3 Recognize typical measurement technologies used in EVSEs.
- 1.4 Recognize typical registration technologies used in EVSEs.
- 1.5 Describe safety features in an EV Fueling System.
- 1.6 Describe the major components of timing devices.
- 1.7 Recognize typical measurement and registration technologies used in timing devices.
- 1.8 Restate that these systems may be made up of measuring elements/modules and indicator elements/modules.
- 1.9 Select the appropriate Handbook 44 Code for the device examined based on the application section of the code.

##### **2 System Markings and Operations**

A weights and measures professional should understand the various marking requirements applicable to a measuring system and demonstrate the ability to operate a measuring system. To demonstrate this the weights and measures professional can:

- 2.1 Recognize and interpret required identification markings on an EVSE.
- 2.2 Recognize and interpret required markings on the controls, indications and features of an EVSE and EVSE with integral time-measuring devices.
- 2.3 Recognize the following functions/operations on a measuring system.
  - 2.3.1 Zero reset mechanism.
  - 2.3.2 Activation controls to control charging.

- 2.3.3 Controls used for the selection of unit prices.
- 2.4 Recognize and interpret the measurement information displayed on a registration element.
- 2.5 Recognize and interpret the measurement information displayed on an indicating element.
- 2.6 Recognize the additional separate charges that may be included in a transaction.

### 3 Technical Requirements

A weights and measures professional should understand the various technical requirements applicable to an EVSE. To demonstrate this the professional can:

- 3.1 Apply the rules regarding the following measuring system features/indications and identify where to find the rule in Handbook 44.
  - 3.1.1 Primary indicating and recording elements
  - 3.1.2 EVSE units of measurement and values of units
  - 3.1.3 Time measurement of units and values of units
  - 3.1.4 EVSE zero reset mechanism
  - 3.1.5 Power loss and transaction termination
  - 3.1.6 Indication of unit price, equipment capacity and type of voltage
  - 3.1.7 EVSE money-value computations
  - 3.1.8 Recorded representations
  - 3.1.9 Indication of delivery
  - 3.1.10 Automatic timeout
  - 3.1.11 Terminal arrangements
  - 3.1.12 Provisions for sealing
  - 3.1.13 Categories of sealing, appropriate seals and audit trails
  - 3.1.14 Connections
  - 3.1.15 Printers and printed receipts
  - 3.1.16 Minimum measured quantity (MMQ)

### 4 User Requirements

A weights and measures professional should understand the various user requirements applicable to an EVSE and timing system. To demonstrate this the professional can:

- 4.1 Assess the suitability of the EVSE and connection cord in accordance with Electric Vehicle Fueling Systems code UR.1.
- 4.2 Assess whether the EVSE is installed in conformance with Electric Vehicle Fueling systems code UR.2.
- 4.3 Assess whether an EVSE is being used in accordance with Electric Vehicle Fueling systems code UR.3.
- 4.4 Assess whether the timing device complies with Timing Devices code UR.1. and UR.2.
- 4.5 Assess whether the EVSE meets General Code, User Requirements.

### 5 Basic Test Procedures

A weights and measures professional should be able to use Handbook 44, NTEP Certificates of

Conformance, and NIST EPO 30 to conduct the appropriate performance tests and evaluate compliance of EVSEs with applicable tolerances and performance standards. To demonstrate this the professional can:

- 5.1 Determine the minimum test drafts and loads required for testing EVSEs.
- 5.2 Test AC systems and evaluate the results for compliance with applicable tolerances.
- 5.3 Test DC systems and evaluate the results for compliance with applicable tolerances.
- 5.4 Inspect DC systems and determine compliance with technical and user requirements. Apply the rules for reading indications and rounding of numerical values.
- 5.5 Inspect AC systems and determine compliance with technical and user requirements. Apply the rules for reading indications and rounding of numerical values.
- 5.6 Conduct appropriate examinations and tests to evaluate that required systems within the EVSE are working correctly and are functioning within tolerance (zero reset, recorded representations, receipts, automatic time out, mathematical agreement, etc.) and comply with safety requirements.
- 5.7 Conduct appropriate tests to evaluate timing devices integral to an EVSE are working correctly and measuring with tolerance.
- 5.8 Apply the information found in an NTEP Certificate of Conformance.
- 5.9 Recognize and apply procedures in EPO 30 including formulas, safety notes and reminders.

**Contributors:**

6-18-2025 – Initial Draft – Jerry Buendel