



ENERGY STAR® Electric Vehicle Supply Equipment CB Webinar

January 12, 2017

ENERGY STAR Products Labeling Program



Webinar Details

- Related materials are available on the EVSE Product Development Web page:
 - www.energystar.gov/NewSpecs
 - *Follow link to “Version 1.0 is in Development” under “Electric Vehicle Supply Equipment”*

The screenshot shows the Energy Star website interface. At the top, there is a navigation bar with the Energy Star logo, the tagline "The simple choice for energy efficiency.", and links for "ABOUT ENERGY STAR" and "PARTNER RESOURCES". Below this, there are four main content areas: "ENERGY EFFICIENT products", "ENERGY SAVINGS at home", "ENERGY EFFICIENT new homes", and "ENERGY STRATEGIES FOR buildings & plants". A breadcrumb trail indicates the current page is "Home » Certified Products » Electric Vehicle Supply Equipment Version 1.0". The page title is "Certified Products" with the subtitle "Your source for energy efficient product information". A navigation menu includes "All Certified Products", "Appliances", "Lighting", "Office Equipment", "Electronics", and "Product Specifications Search". The main content area features the heading "Electric Vehicle Supply Equipment Version 1.0" and a paragraph stating that EPA is currently developing a new product specification for EVSE and encourages interested parties to contact ElectricVehicleSupplyEquipment@energystar.gov. The date "Tuesday, December 27, 2016" is displayed, followed by the sub-heading "EVSE Final Version 1.0 Program Requirements". A paragraph explains that on December 27, the U.S. Environmental Protection Agency (EPA) finalized the Version 1.0 ENERGY STAR Program Requirements for EVSE. Below this, there are four links to related documents: "Final Version 1.0 EVSE Cover Memo (PDF, 149 KB)", "Final Version 1.0 EVSE Program Requirements (PDF, 711 KB)", "Final Draft Version 1.0 EVSE Specification Comment Response (PDF, 111 KB)", and "EVSE Version 1.0 Dataset (OFFICEDOCUMENT, 161 KB)".



Webinar Agenda

- Introductions
- Specification
 - Definitions
 - No Vehicle Mode Requirements
 - Partial On Mode Requirements
 - Idle Mode Requirements
 - Connected Functionality
- Testing
- Timeline and Application Process



Introductions

Verena Radulovic

U.S. Environmental Protection Agency

Eamon Monahan

U.S. Environmental Protection Agency

Emmy Feldman

ICF International

Matt Malinowski

ICF International

Doug Frazee

ICF International



Specification – Definitions

- **EVSE:** the conductors, including the ungrounded, grounded, and equipment grounding conductors, the electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatuses installed specifically for the purpose of delivering energy from the premises wiring to the electric vehicle. Charging cords with NEMA 5-15P and NEMA 5-20P attachment plugs are considered EVSEs. Excludes conductors, connectors, and fittings that are part of the vehicle.
- *Level 1 and Level 2 AC EVSE are included in the scope of the Version 1.0 EVSE Specification:*
 - **Level 1** has an input voltage nominally 120 V ac and maximum output current less than or equal to 16 A ac
 - **Level 2** has an input voltage range from 208 to 240 V ac and maximum output current less than or equal to 80 A ac

Specification – Boundary Condition

- The EVSE specification is focused on the EVSE only and excludes the vehicle from the scope.

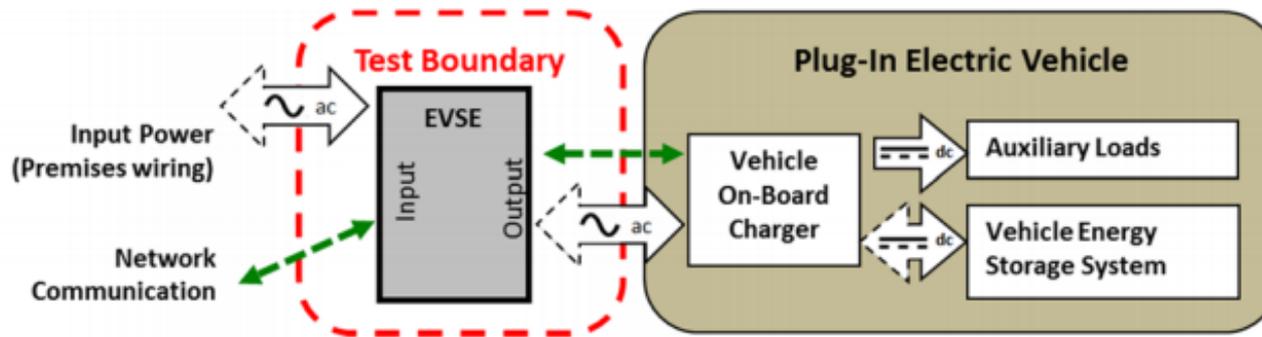


Figure 1: Schematic of Overall Plug-In Vehicle Charging System Detailing EVSE Test Boundary

Specification – Operational Modes

Table 1: Operational Modes and Power States

Operational Modes	Most closely related Interface State as Defined in SAE J1772	Further Description
No Vehicle Mode	State A	No Vehicle Mode is associated with State A, or where the EVSE is not connected to the EV. The EVSE is connected to external power and is providing only tertiary functions.
Partial On Mode	State B1 or State B2	Partial On Mode is associated with State B1 or State B2 where the vehicle is connected but is not ready to accept energy. Sub-state B1 is where the EVSE is not ready to supply energy and sub-state B2 is where the EVSE is ready to supply energy.
On Mode		
Idle Mode	State C	Idle Mode is associated with State C, where the vehicle is connected and ready to accept energy and the EVSE is capable of promptly providing current to the EV but is not doing so.
Operation Mode	State C	Operation Mode is associated with State C, where the EVSE is providing the primary function, or providing current to a connected load (i.e., the relay is closed and the vehicle is not drawing current).



Scope

- Included Products
 - Products that meet the definition for EVSE as specified herein are eligible for ENERGY STAR certification, with the exception of products listed in Section 2.2. In addition, eligible EVSE shall fall into one of the following categories:
 - i. Level 1 EVSE.
 - ii. Level 2 EVSE.
 - iii. Dual Input Level 1 and Level 2 EVSE.

- Excluded Products
 - The following products are not eligible for certification under this specification:
 - i. Dc Output EVSE.
 - ii. Wireless/Inductive EVSE.
 - iii. Power electronic components inside the vehicle



General Requirements

- Each EVSE submitted for ENERGY STAR certification shall be Listed by a Nationally Recognized Testing Laboratory (NRTL) for safety.
- Dual Input Level 1 and Level 2 EVSE shall meet all requirements and report information in both configurations.



No Vehicle Mode Requirements

- The No Vehicle Mode power measured during testing shall be less than or equal to the Maximum No Vehicle Mode Power Requirement:

Equation 1: Calculation of Maximum No Vehicle Mode Power Requirement

$$P_{NO_VEHICLE_MAX} = 2.6 + P_{WAKE} + P_{DISPLAY}$$

Where:

- $P_{NO_VEHICLE_MAX}$ is the Maximum No Vehicle Mode Power Requirement;
- P_{WAKE} is the No Vehicle Mode power allowance for the network connection with wake capability enabled during testing listed in Table 2; and
- $P_{DISPLAY}$ is the No Vehicle Mode power allowance for a High Resolution Display enabled during testing listed in Table 2.



Table 2: No Vehicle Mode Power Allowances

Product Function	No Vehicle Mode Power Allowance (watts, rounded to the nearest 0.1 W for reporting)
In-use Wi-Fi or Ethernet Interface with Wake Capability (P_{WAKE})	$\frac{1.0}{n}$ Where: <ul style="list-style-type: none"> n is the number of outputs.
In-use Cellular with Wake Capability (P_{WAKE})	$\frac{2.0}{n}$ Where: <ul style="list-style-type: none"> n is the number of outputs.
Other In-use LAN (Local Area Network) Interface with Wake Capability (P_{WAKE})	$\frac{1.0}{n}$ Where: <ul style="list-style-type: none"> n is the number of outputs.
In-use High Resolution Display ($P_{DISPLAY}$)	$\frac{[(4.0 \times 10^{-5} \times \ell \times A) + 119 \times \tanh(0.0008 \times [A - 200.0] + 0.11) + 6.0]}{n}$ Where: <ul style="list-style-type: none"> A is the Screen Area in square inches; ℓ is the Maximum Measured Luminance of the Display in candelas per square meter, as measured in Section 4) C) of the ENERGY STAR Test Method for Determining Electric Vehicle Supply Equipment Energy; \tanh is the hyperbolic tangent function; and n is the number of outputs. <p>Example: For a single-output EVSE with a maximum measured luminance of 300 candelas/m² and a 5×5 inch screen, the allowance for the in-use display would be 2.7 watts.</p>



Partial On Mode Requirements

- The Partial On Mode power measured during testing shall be less than or equal to the Maximum Partial On Mode Power Requirement:

Equation 2: Calculation of Maximum Partial On Mode Power Requirement

$$P_{PARTIAL_ON_MAX} = 2.6 + P_{WAKE} + P_{DISPLAY}$$

Where:

- *$P_{PARTIAL_ON_MAX}$ is the Maximum Partial On Mode Power Requirement;*
- *P_{WAKE} is the Partial On Mode power allowance for the network connection with wake capability enabled during testing listed in Table 3; and*
- *$P_{DISPLAY}$ is the Partial On Mode power allowance for a High Resolution Display enabled during testing listed in Table 3.*

Table 3: Partial On Mode Power Allowances

Product Function	Partial On Mode Power Allowance (watts, rounded to the nearest 0.1 W for reporting)
In-use Wi-Fi or Ethernet Interface with Wake Capability (P_{WAKE})	$\frac{1.0}{n}$ <p><i>Where:</i></p> <ul style="list-style-type: none"> n is the number of outputs.
In-use Cellular with Wake Capability (P_{WAKE})	$\frac{2.0}{n}$ <p><i>Where:</i></p> <ul style="list-style-type: none"> n is the number of outputs.
Other In-use LAN (Local Area Network) Interface with Wake Capability (P_{WAKE})	$\frac{1.0}{n}$ <p><i>Where:</i></p> <ul style="list-style-type: none"> n is the number of outputs.
In-use High Resolution Display ($P_{DISPLAY}$)	$\frac{[(4.0 \times 10^{-5} \times \ell \times A) + 119 \times \tanh(0.0008 \times [A - 200.0] + 0.11) + 6.0]}{n}$ <p><i>Where:</i></p> <ul style="list-style-type: none"> A is the Screen Area in square inches; ℓ is the Maximum Measured Luminance of the Display in candelas per square meter, as measured in Section 4) C) of the ENERGY STAR Test Method for Determining Electric Vehicle Supply Equipment Energy; \tanh is the hyperbolic tangent function; and n is the number of outputs. <p>Example: For a single-output EVSE with a maximum measured luminance of 300 candelas/m² and a 5×5 inch screen, the allowance for the in-use display would be 2.7 watts.</p>



Idle Mode Requirements

- The Idle Mode power measured during testing shall be less than or equal to the Maximum Idle Mode Power Requirement:

Equation 3: Calculation of Maximum Idle Mode Power Requirement

$$P_{IDLE_MAX} = (0.4 \times \text{Max Current}) + 2.6 + P_{WAKE} + P_{DISPLAY}$$

Where:

- P_{IDLE_MAX} is the Maximum Idle Mode Power Requirement, in watts;
- Max Current is the Nameplate Maximum Output Current, in amperes;
- P_{WAKE} is the Idle Mode power allowance for the network connection with wake capability enabled during testing listed in Table 4; and
- $P_{DISPLAY}$ is the Idle Mode power allowance for a High Resolution Display enabled during testing listed in Table 4.

Table 4: Idle Mode Power Allowances

Product Function	Idle Mode Power Allowance (watts, rounded to the nearest 0.1 W for reporting)
In-use Wi-Fi or Ethernet Interface with Wake Capability (P_{WAKE})	$\frac{1.0}{n}$ <p><i>Where:</i></p> <ul style="list-style-type: none"> n is the number of outputs.
In-use Cellular with Wake Capability (P_{WAKE})	$\frac{2.0}{n}$ <p><i>Where:</i></p> <ul style="list-style-type: none"> n is the number of outputs.
Other In-use LAN (Local Area Network) Interface with Wake Capability (P_{WAKE})	$\frac{1.0}{n}$ <p><i>Where:</i></p> <ul style="list-style-type: none"> n is the number of outputs.
In-use High Resolution Display ($P_{DISPLAY}$)	$\frac{[(4.0 \times 10^{-5} \times \ell \times A) + 119 \times \tanh(0.0008 \times [A - 200.0] + 0.11) + 6.0]}{n}$ <p><i>Where:</i></p> <ul style="list-style-type: none"> A is the Screen Area in square inches; ℓ is the Maximum Measured Luminance of the Display in candelas per square meter, as measured in Section 4) C) of the ENERGY STAR Test Method for Determining Electric Vehicle Supply Equipment Energy; \tanh is the hyperbolic tangent function; and n is the number of outputs. <p>Example: For a single-output EVSE with a maximum measured luminance of 300 candelas/m² and a 5×5 inch screen, the allowance for the in-use display would be 2.7 watts.</p>

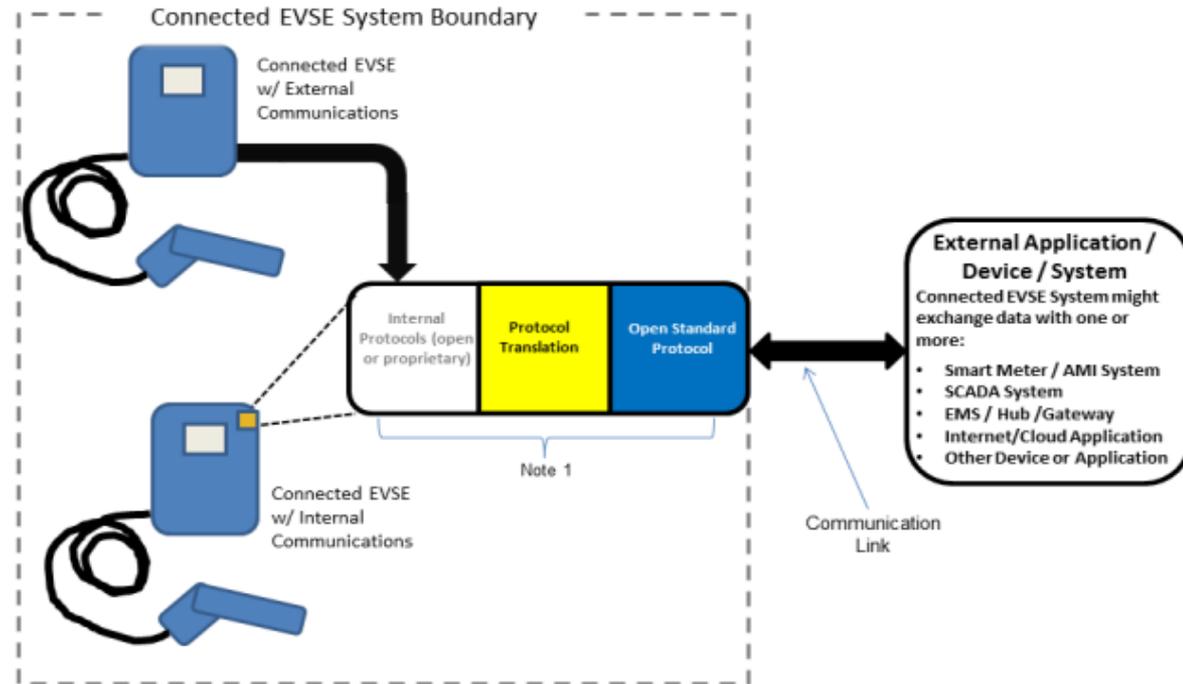


Requirements for Each Mode

- For products with ABC enabled by default, the average Modal power in high and low illuminance conditions shall be used as the measured Modal power
- For products capable of network connection with multiple protocols (e.g., Wi-Fi and Cellular), only the allowance for the protocol enabled during testing shall be claimed.
- So only one of these:
 1. Wi-Fi
 2. Ethernet (Energy Efficient Ethernet, if supported)
 3. Cellular
 4. Other

Connected Functionality

- EVSE that meet the connected functionality criteria shall be capable of supporting Demand Response (DR) (e.g., via software updates or integration with an external service).
- Compliance with this section is **optional**. ENERGY STAR certified EVSE that comply with all connected criteria will be identified on the ENERGY STAR website as having ‘Connected’ functionality.



Note: Communication device(s), link(s) and/or processing that enables Open Standards-based communication between the EVSE and external application / device / system(s). These elements, either individually or together, could be within the EVSE, and/or an external communication module, a hub/gateway, or in the Internet/cloud.



Connected Functionality Requirements

- Grid Communications: the product shall include a communication link that is capable of supporting DR and this link shall use open standards
 - Open Charge Point Protocol (OCPP) can be used for products that include a communication link
 - Open Standards:
 - 1) Included in the Smart Grid Interoperability Panel (SGIP) Catalog of Standards, and/or
 - 2) Included in the National Institute of Standards and Technology (NIST) Smart Grid framework Tables 4.1 and 4.2, and/or
 - 3) Adopted by the American National Standards Institute (ANSI) or another well-established international standards organization such as the International Organization for Standardization (ISO), International Electrotechnical Commission (IEC), International Telecommunication Union (ITU), Institute of Electrical and Electronics Engineers (IEEE), or Internet Engineering Task Force (IETF).



Connected Functionality Requirements

- Open Access: To enable interconnection with the product over the communication link, an interface specification, application programming interface (API) or similar documentation that is intended to enable DR functionality shall be made readily available
- Consumer Override: The product shall be capable of supporting DR event override-ability by consumers



Connected Functionality Requirements

- Capabilities Summary: A ≤4000 character (approximately 500 words or less) summary description of the EVSE system's and/or associated Service Provider's DR capabilities/services shall be submitted.
- In this summary, the following shall be included:
 - i. DR Support, e.g., implemented, planned for CY2017.
 - ii. For products that do not ship with DR capabilities enabled, the steps needed to enable these capabilities.



Connected Functionality Requirements

- In the capabilities summary, EPA recommends noting the following, as applicable:
 - iii. DR services that the product has the capability to participate in such as load dispatch, ancillary services (including V2G), price notification and price response.
 - iv. Whether the EVSE can be directly addressed via the interface specification, API or similar documentation.
 - v. Support for locational DR, e.g., to ZIP code(s), feeder(s), or to EVSE endpoints specified by the Load Management Entity.
 - vi. List open communications supported by the EVSE, including applicable certifications.
 - vii. Feedback to Load Management Entity, e.g., verification/M&V, override notification.
 - viii. Response configurability/flexibility by the consumer and/or Load Management Entity.
 - ix. Measures to limit consumer impacts, if any.



Testing

Table 5: Test Methods for ENERGY STAR Certification

Product Type	Test Method
All Electric Vehicle Supply Equipment	ENERGY STAR Electric Vehicle Supply Equipment Test Method (Rev. Dec-2016)
Electric Vehicle Supply Equipment with Display	ENERGY STAR Displays Test Method (Rev. Sep-2015)
Electric Vehicle Supply Equipment with Full Network Connectivity	Section 6.7.5.2 of Consumer Electronics Association (CEA) 2037-A, Determination of Television Set Power Consumption



Timeline to Implement Version 1.0

- December 29: Deadline for comments on the QPX requirements.
- January 12: EVSE CB Training Webinar
- Week of January 9: Web services available for testing
- January 20: Deadline for first batch of CB applications
- January 25: EPA announces recognized CBs
- Week of January 23: Web service live and available for certification submissions



Application Process

- If you have not already, please send a signed application and evidence that you have contacted your accreditation body requesting a scope expansion for the EVSE program to certification@energystar.gov
- Submit test data successfully to EPA via the web service for Electric Vehicle Supply Equipment once the web service is available for testing.
- EPA will recognize CBs for this new category pending a formal scope expansion from an accreditation body.
- Submission deadline for those CBs that want to be among the first batch recognized will be January 20.
- EPA will continue to accept applications at any time, but cannot guarantee prompt recognition for those that apply after January 20.

Submission Deadline
January 20



Thank you!

To be added to EPA's stakeholder listserve to receive specification updates, please email:
EVSE@energystar.gov.

Verena Radulovic
(202) 343-9845
Radulovic.Verena@epa.gov

Eamon Monahan
(202) 343-9589
Monahan.Eamon@epa.gov

