



ENERGY STAR® Program Requirements for Electric Vehicle Supply Equipment

Draft Partner Commitments

Following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacture and labeling of ENERGY STAR qualified products. The ENERGY STAR Partner must adhere to the following partner commitments:

Qualifying Products

1. Comply with current ENERGY STAR Eligibility Criteria, which define performance requirements and test procedures for Electric Vehicle Supply Equipment. A list of eligible products and their corresponding Eligibility Criteria can be found at www.energystar.gov/specifications.
2. Prior to associating the ENERGY STAR name or mark with any product, obtain written certification of ENERGY STAR qualification from a Certification Body recognized by EPA for Electric Vehicle Supply Equipment. As part of this certification process, products must be tested in a laboratory recognized by EPA to perform Electric Vehicle Supply Equipment testing. A list of EPA-recognized laboratories and certification bodies can be found at www.energystar.gov/testingandverification.

Using the ENERGY STAR Name and Marks

3. Comply with current ENERGY STAR Identity Guidelines, which define how the ENERGY STAR name and marks may be used. Partner is responsible for adhering to these guidelines and ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance. The ENERGY STAR Brand Book is available at www.energystar.gov/logouse.
4. Use the ENERGY STAR name and marks only in association with qualified products. Partner may not refer to itself as an ENERGY STAR Partner unless at least one product is qualified and offered for sale in the U.S. and/or ENERGY STAR partner countries.
5. Provide clear and consistent labeling of ENERGY STAR qualified Equipment.

5.1. The ENERGY STAR mark must be clearly displayed:

5.1.1. And permanently affixed to the front of the product or on/next to the machine nameplate;

Option for electronic labeling: In instances where an electronic display is present, manufacturers have the option of displaying an electronic label in place of a physical label in a corner of the display, at system start-up, between marketing segments, or at the beginning of a transaction, as long it meets the following requirements:

– The ENERGY STAR mark in cyan, black, or white (as described in the ENERGY STAR Brand Book available at www.energystar.gov/logouse).

The electronic mark must display for a minimum of 5 seconds;

– The ENERGY STAR mark must be at least 10% of the screen by area, may not be smaller than 76 pixels x 78 pixels, and must be legible.

EPA will consider alternative proposals regarding approach, duration, or size for electronic labeling on a case-by-case basis.

Note: EPA continues to seek feedback from stakeholders on the feasibility of the proposed electronic labelling options.

- 5.1.2. In product literature (i.e., user manuals, spec sheets, etc.);
- 5.1.3. On product packaging; and
- 5.1.4. On the manufacturer's Internet site where information about ENERGY STAR qualified models is displayed.

Verifying Ongoing Product Qualification

- 6. Participate in third-party verification testing through a Certification Body recognized by EPA for Electric Vehicle Supply Equipment, providing full cooperation and timely responses, EPA/DOE may also, at its discretion, conduct tests on products that are referred to as ENERGY STAR qualified. These products may be obtained on the open market, or voluntarily supplied by Partner at the government's request.

Providing Information to EPA

- 7. Provide unit shipment data or other market indicators to EPA annually to assist with creation of ENERGY STAR market penetration estimates, as follows:
 - 7.1. Partner must submit the total number of ENERGY STAR qualified Electric Vehicle Supply Equipment shipped in the calendar year or an equivalent measurement as agreed to in advance by EPA and Partner. Partner shall exclude shipments to organizations that rebrand and resell the shipments (unaffiliated private labelers).
 - 7.2. Partner must provide unit shipment data segmented by meaningful product characteristics (e.g., type, capacity, presence of additional functions) as prescribed by EPA.
 - 7.3. Partner must submit unit shipment data for each calendar year to EPA or an EPA-authorized third party, preferably in electronic format, no later than March 1 of the following year.Submitted unit shipment data will be used by EPA only for program evaluation purposes and will be closely controlled. If requested under the Freedom of Information Act (FOIA), EPA will argue that the data is exempt. Any information used will be masked by EPA so as to protect the confidentiality of the Partner.
- 8. Report to EPA any attempts by recognized laboratories or Certification Bodies (CBs) to influence testing or certification results or to engage in discriminatory practices.
- 9. Notify EPA of a change in the designated responsible party or contacts within 30 days using the My ENERGY STAR Account tool (MESA) available at www.energystar.gov/mesa.

Training and Consumer Education

- 10. Partner shall agree to complete steps to educate users about the benefits of more energy efficient products by including the following information with each EVSE (i.e., in the user manual or on a box insert):
 - 10.1. Energy saving potential;
 - 10.2. Financial saving potential;
 - 10.3. Environmental benefits;
 - 10.4. Information on ENERGY STAR and a link to www.energystar.gov; and
 - 10.5. ENERGY STAR logo (used in accordance with the ENERGY STAR Brand Book available at www.energystar.gov/logos).

11. At the manufacturer's request, EPA will supply suggested facts and figures related to the above criteria, template elements, or a complete template suitable for use in user guides or box inserts.

Performance for Special Distinction

In order to receive additional recognition and/or support from EPA for its efforts within the Partnership, the ENERGY STAR Partner may consider the following voluntary measures, and should keep EPA informed on the progress of these efforts:

- Provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and its message.
- Consider energy efficiency improvements in company facilities and pursue benchmarking buildings through the ENERGY STAR Buildings program.
- Purchase ENERGY STAR qualified products. Revise the company purchasing or procurement specifications to include ENERGY STAR. Provide procurement officials' contact information to EPA for periodic updates and coordination. Circulate general ENERGY STAR qualified product information to employees for use when purchasing products for their homes.
- Feature the ENERGY STAR mark(s) on Partner website and other promotional materials. If information concerning ENERGY STAR is provided on the Partner website as specified by the ENERGY STAR Web Linking Policy (available in the Partner Resources section of the ENERGY STAR website), EPA may provide links where appropriate to the Partner website.
- Ensure the power management feature is enabled on all ENERGY STAR qualified displays and computers in use in company facilities, particularly upon installation and after service is performed.
- Provide general information about the ENERGY STAR program to employees whose jobs are relevant to the development, marketing, sales, and service of current ENERGY STAR qualified products.
- Provide a simple plan to EPA outlining specific measures Partner plans to undertake beyond the program requirements listed above. By doing so, EPA may be able to coordinate, and communicate Partner's activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR website, etc. The plan may be as simple as providing a list of planned activities or milestones of which Partner would like EPA to be aware. For example, activities may include: (1) increasing the availability of ENERGY STAR qualified products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrating the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) providing information to users (via the website and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products; and (4) building awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event.
- Join EPA's SmartWay Transport Partnership to improve the environmental performance of the company's shipping operations. The SmartWay Transport Partnership works with freight carriers, shippers, and other stakeholders in the goods movement industry to reduce fuel consumption, greenhouse gases, and air pollution. For more information on SmartWay, visit www.epa.gov/smartway.
- Join EPA's Green Power Partnership. EPA's Green Power Partnership encourages organizations to buy green power as a way to reduce the environmental impacts associated with traditional fossil fuel-based electricity use. The partnership includes a diverse set of organizations including Fortune 500 companies, small and medium businesses, government institutions as well as a growing number of colleges and universities. For more information on Green Power, visit www.epa.gov/greenpower.



ENERGY STAR® Product Specification for Electric Vehicle Supply Equipment

Eligibility Criteria Draft 2 Version 1.0

1 Following is the Version 1.0 ENERGY STAR product specification for Electric Vehicle Supply Equipment.
2 A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

1 DEFINITIONS

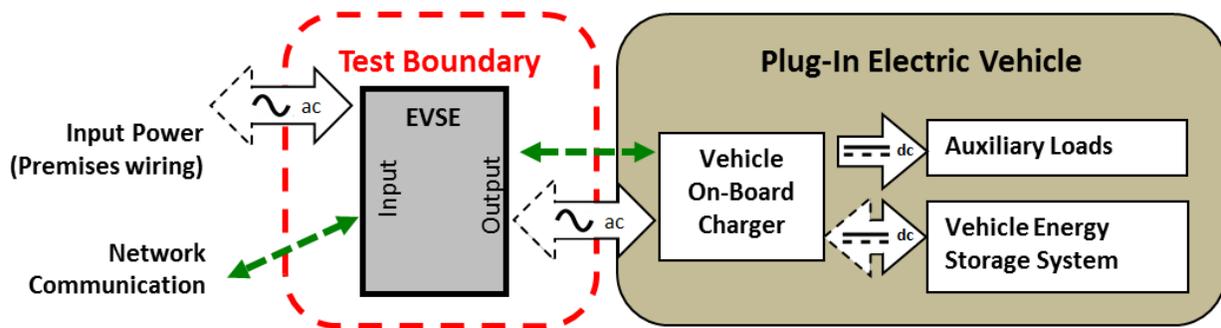
3
4 A) Electric Vehicle Supply Equipment (EVSE): The conductors, including the ungrounded, grounded,
5 and equipment grounding conductors, the electric vehicle connectors, attachment plugs, and all other
6 fittings, devices, power outlets, or apparatuses installed specifically for the purpose of delivering
7 energy from the premises wiring to the electric vehicle. Charging cords with NEMA 5-15P and NEMA
8 5-20P attachment plugs are considered EVSEs. Excludes conductors, connectors, and fittings that
9 are part of the vehicle.¹

10 1) Level 1: A galvanically-connected EVSE with a single-phase input voltage nominally 120 volts ac
11 and maximum output current less than or equal to 16 amperes ac.²

12 2) Level 2: A galvanically-connected EVSE with a single-phase input voltage range from 208 to 240
13 volts ac and maximum output current less than or equal to 80 amperes ac.²

14 3) Fast dc: A galvanically-connected EVSE that includes an off-board charger and provides dc
15 current greater than or equal to 80 amperes dc.

16 4) Wireless / Inductive: A non-galvanically-connected EVSE.
17



18
19 **Figure 1: Schematic of Overall Plug-In Vehicle Charging System detailing EVSE Test Boundary**

20 B) EVSE Functions:

21 1) Primary Function: Providing current to a connected load.

22 2) Secondary Function: Function that enables, supplements or enhances a primary function. For
23 EVSE, Secondary Functions are:

24 a) Automatic Brightness Control (ABC): The self-acting mechanism that controls the brightness
25 of a display or lamp as a function of ambient light.

¹ SAE J2894-1 Section 3.10.

² This definition is intended to be consistent with the requirements in SAE J1772, with some additional clarifications.

26 b) Full Network Connectivity: The ability of the EVSE to maintain network presence while in
27 Partial On mode.

28 Note: Presence of the EVSE's network services, its applications, and possibly its display is
29 maintained even if some components of the EVSE are powered down. The EVSE can elect
30 to change power states based on receipt of network data from remote network devices, but
31 should otherwise stay in a low power mode absent a demand for services from a remote
32 network device.

33 c) Occupancy Sensing: detection of human or object presence in front of or in the area
34 surrounding an EVSE.

35 d) Communicating with the vehicle;

36 e) Illumination of display, indicator lights, or ambient lighting;

37 f) Public access control (RFID card, authorization, etc.);

38 g) Control Pilot Signal;

39 h) Wake-up function.

40 3) Tertiary Function: Function other than a primary or a secondary function.

41 Example: An EMC filter and status indication provides their function in Off Mode, Partial On
42 Mode, and On Mode.

43 **Note**: EPA has eliminated the mention of area lighting in the tertiary function definition due to confusion
44 with ambient lighting in the secondary function definition.

45 C) EVSE Operational Modes and Power States:

46 Note: The transition period to a different mode; whether automatically initiated, or via user action;
47 does not constitute a mode.

48 1) Disconnected: Condition of the equipment during which all connections to power sources
49 supplying the equipment are removed or galvanically isolated and no functions depending on
50 those power sources are provided. The term power source includes power sources external and
51 internal to the equipment.

52 2) Off Mode: Condition during which the equipment is connected to external power and is only
53 providing tertiary function(s). Off Mode is intended to be the lowest-power mode of the EVSE that
54 can only be entered or exited through manual intervention.

55 Note: The vehicle-EVSE interface is in State A of SAE J1772, where the vehicle is not connected.
56 ³

57 3) On Mode: Condition during which the equipment provides the primary function or can promptly
58 provide the primary function.

59 a) Operation Mode: Condition during which the equipment is performing the primary function.

60 Note: The vehicle-EVSE interface is in State C, where the vehicle is connected and accepting
61 energy.³

62 b) Idle Mode: Condition during which the equipment can promptly provide the primary function
63 but is not doing so.

64 Note: Idle mode is the condition within On Mode where the EVSE is connected to the vehicle
65 or vehicle simulator but is not actively providing current. The vehicle-EVSE interface is in
66 State C, where the vehicle is connected and ready to accept energy.³

³ This mode is intended to be associated with a vehicle/EVSE interface state (e.g., A, B, or C) as defined in SAE J1772.

67 4) Partial On Mode: Condition during which the equipment provides at least one secondary function
 68 but no primary function.

69 Note: The vehicle-EVSE interface is in state B1 or B2, where the vehicle is connected but not
 70 ready to accept energy and the EVSE is or is not ready to supply energy.³

71 **Table 1: Operational Modes and Power States**

Operational Modes	Most closely related Interface State as Defined in SAE J1772	Further Description
Off Mode	State A	Off Mode is associated with State A, or where the vehicle is not connected to the EV. The EVSE is connected to external power and is providing only tertiary functions.
On Mode		
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.
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.
Partial On Mode	State B	Partial On Mode is associated with State B 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.

72

73 **Note:** Due to stakeholder feedback asking for further clarification of the definitions of the vehicle-EVSE
 74 interface states, EPA is crosswalking the proposed ENERGY STAR modal definitions with SAE J1772
 75 definitions of each state (States A, B1, B2, and C) within the modal definitions to demonstrate the intent of
 76 each of mode and how each most closely resembles industry-accepted state definitions. The SAE
 77 J2894/2 standard contains modal definitions that are out of scope of the ENERGY STAR specification
 78 because they cover the entire EVSE/EV system, taking into account EV on-board charging efficiency. The
 79 SAE J1772 standard only relates to the interface between the EVSE and EV. In contrast, this
 80 specification encompasses only the EVSE. Since neither of the SAE J2894/2 or SAE J1772 standards
 81 have definitions specific to the modes of an EVSE, EPA proposes modal definitions for an EVSE to be
 82 able to create a uniform way to test and measure an EVSE’s standalone power consumption.

83 5) Power Management: Automatic control mechanism that achieves the smallest power consistent
 84 with a pre-determined level of functionality.

85 D) Other:

86 1) Apparent power (S): The product of RMS voltage and RMS current, which is equal to magnitude
 87 of the complex power, and measured in volt-amperes (VA).

88 2) Average power (P) (also real power): The power in a circuit which is transformed from electric to
89 non-electric energy and is measured in watts (W). For a two-terminal device with instantaneous
90 current and voltage waveforms $i(t)$ and $v(t)$ which are periodic with period T , the real or average
91 power P is⁴:

$$P = \frac{1}{T} \int_0^T v(t)i(t)dt$$

93 3) Duty Cycle: The ratio or a given time interval of the uninterrupted duration at the high logic state
94 to the total time.

95 Note: This duty cycle, lying between 0 and 1, may be expressed as a percentage.

96 4) Power Factor (PF): The ratio of the average power (P) consumed in watts to the apparent power
97 (S), drawn in volt-amperes.

$$PF = \frac{P}{S}$$

99 5) Unit Under Test (UUT): The specific sample of a representative model undergoing measurement
100 which includes the base product and any accessories packaged with it.

101 6) Illuminance: means the luminous flux per unit area of light illuminating a given surface, expressed
102 in units of lux.

103 E) Product Family: A group of product models that are (1) made by the same manufacturer, (2) subject
104 to the same ENERGY STAR qualification criteria, and (3) of a common basic design. Product models
105 within a family differ from each other according to one or more characteristics or features that either
106 (1) have no impact on product performance with regard to ENERGY STAR qualification criteria, or (2)
107 are specified herein as acceptable variations within a Product Family. For EVSE, acceptable
108 variations within a Product Family include:

- 109 1) Color,
- 110 2) Output cable, and
- 111 3) Housing.

112 F) Connected Functionality Definitions

113 1) Communication Link: The mechanism for bi-directional data transfers between the EVSE and one
114 or more external applications, devices or systems.

115 2) Demand Response (DR): Changes in electric usage by demand-side resources from their normal
116 consumption patterns in response to changes in the price of electricity over time, or to incentive
117 payments designed to induce lower electricity use at times of high wholesale market prices or
118 when system reliability is jeopardized⁵.

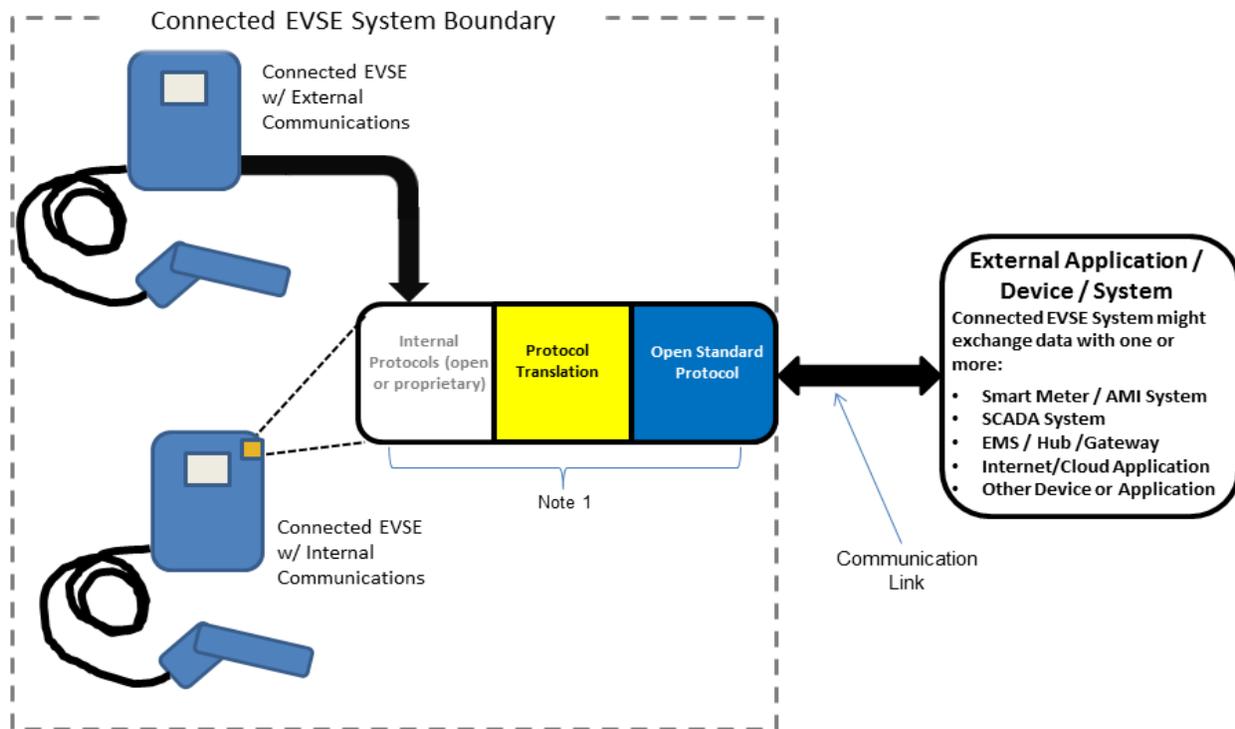
119 3) Demand Response Management System (DRMS): The system operated by a program
120 administrator, such as the utility or third party, which dispatches signals with DR instructions
121 and/or price signals to the ENERGY STAR EVSE and receives messages from the EVSE.

122 4) EVSE System: As shown in Figure 2, it includes the ENERGY STAR certified EVSE, integrated or
123 separate communications hardware, and additional hardware and software required to enable
124 connected functionality.

125 5) Load Management Entity: DRMS, home energy management system, etc.

⁴ Average power is intended to align with the definition of real power in SAE J2894

⁵ Federal Energy Regulatory Commission, <http://www.ferc.gov/industries/electric/indus-act/demand-response/dem-res-adv-metering.asp>



126

127

Figure 2: Connected EVSE System

128 Note 1: Communication device(s), link(s) and/or processing that enables Open Standards-based
 129 communication between the EVSE and external application / device / system(s). These elements, either
 130 individually or together, could be within the EVSE, and/or an external communication module, a
 131 hub/gateway, or in the Internet/cloud.

132 G) Open Standards: Standards that are:

- 133 1) Included in the Smart Grid Interoperability Panel (SGIP) Catalog of Standards,⁶ and/or
 134 2) Included in the National Institute of Standards and Technology (NIST) Smart Grid framework
 135 Tables 4.1 and 4.2,⁷ and/or
 136 3) Adopted by the American National Standards Institute (ANSI) or another well-established
 137 international standards organization such as the International Organization for Standardization
 138 (ISO), International Electrotechnical Commission (IEC), International Telecommunication Union
 139 (ITU), Institute of Electrical and Electronics Engineers (IEEE), or Internet Engineering Task Force
 140 (IETF).

141 H) **Acronyms**:

- 142 1) A: Ampere
 143 2) ABC: Automatic Brightness Control
 144 3) ac: Alternating Current
 145 4) dc: Direct Current
 146 5) DOE: U.S. Department of Energy

⁶ http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/PMO#Catalog_of_Standards_Processes

⁷ http://www.nist.gov/smartgrid/upload/NIST_Framework_Release_2-0_corr.pdf

- 147 6) DR: Demand Response
148 7) EPA: Environmental Protection Agency
149 8) EVSE: Electric Vehicle Supply Equipment
150 9) IEC: International Electrotechnical Commission
151 10) IEEE: Institute of Electrical and Electronics Engineers
152 11) NEMA: National Electrical Manufacturers Association
153 12) SAE: Society of Automotive Engineers
154 13) UUT: Unit Under Test
155 14) V: Volt
156 15) W: Watts

157 **2 SCOPE**

158 **2.1 Included Products**

- 159 2.1.1 Level 1 EVSE.
160 2.1.2 Level 2 EVSE.
161 2.1.3 Dual input Level 1 & Level 2 EVSE.

162 **2.2 Excluded Products**

- 163 2.2.1 Products that are covered under other ENERGY STAR product specifications are not eligible for
164 certification under this specification. The list of specifications currently in effect can be found at
165 www.energystar.gov/specifications.
166 2.2.2 dc output EVSE.
167 2.2.3 Wireless/Inductive EVSE.
168 2.2.4 Power electronic components inside the vehicle.

169 **3 CERTIFICATION CRITERIA**

170 **3.1 General Requirements, Significant Digits, and Rounding**

- 171 3.1.1 All EVSE shall report certification to which, if any, applicable product safety standards by a
172 Nationally Recognized Testing Laboratory. Applicable safety standards applicable typically
173 include one or more of the following:
- 174 • UL 2594
 - 175 • UL 2231
 - 176 • UL 1998

177 **Note:** EPA received feedback from stakeholders that products that do not adhere to safety standards
178 may demonstrate lower power consumption, given differences in how the products are constructed. It is
179 EPA's understanding that, at this time, the EVSE market has not universally adhered to safety standards,
180 and that they remain a differentiating feature among EVSE products. To offset any incentive for product
181 manufacturers to forgo safety standards in the interest of saving energy, EPA proposes that ESVE
182 manufacturers report which safety standards are met so this information can be shared with potential
183 purchasers as part of the ENERGY STAR product finder.

184 3.1.2 All calculations shall be carried out with actual measured (unrounded) values. Only the final result
185 of a calculation shall be rounded.

186 3.1.3 Unless otherwise specified within this specification, compliance with specification limits shall be
187 evaluated using exact values without any benefit from rounding.

188 3.1.4 Directly measured or calculated values that are submitted for reporting on the ENERGY STAR
189 website shall be rounded to the nearest significant digit as expressed in the corresponding
190 specification limit.

191 **Note:** EPA received substantial stakeholder feedback that an EVSE can only power down to a lower
192 power state after the EV has released the connection to the EVSE such that current no longer passes
193 through. Therefore, EPA proposes to remove APD as a requirement. Instead, EPA proposes a 2 minute
194 delay before testing the maximum Partial On Mode power to ensure that the UUT has already
195 transitioned to this state. EPA believes that an EVSE is capable of powering down any unnecessary
196 features during this 2 minute delay period thereby capturing any potential power management
197 capabilities. With this approach, EPA continues to incentivize EVSE power management and also
198 provides manufacturers with flexibility to decide which feature(s) will be turned off or how EVSE can enter
199 lower power state during this delay period.

200 **3.2 Partial On Mode Requirements**

201 Note: These requirements refer to the SAE J1772 State B.

202 3.2.1 Measured Partial On Mode power ($P_{PARTIAL_ON}$) shall be less than or equal to the Maximum Partial
203 On Mode Power Requirement ($P_{PARTIAL_ON_MAX}$), as calculated per Equation 1.

204 i. If a product's Idle Mode meets the Partial On Mode power requirements, the product does not
205 need to meet the separate Partial On Mode requirements.

206 ii. For products with ABC enabled by default, the average Partial On Mode power in high and
207 low illuminance conditions shall be used in place of $P_{PARTIAL_ON}$, above.

208 **Equation 1: Calculation of Maximum Partial On Mode Power Requirement**

209
$$P_{PARTIAL_ON_MAX} = P_{PARTIAL_ON_BASE} + \sum_{i=1}^n P_{WAKE_i}$$

210 Where:

- 211 ▪ $P_{PARTIAL_ON_MAX}$ is the Maximum Partial On Mode Power
212 Requirement;
- 213 ▪ $P_{PARTIAL_ON_BASE}$ is the base Partial On Mode power allowance for
214 all products, as specified in Table ;
- 215 ▪ P_{WAKE_i} is the Partial On Mode power allowance for each active,
216 in-use networking/control protocol that provides remote hosts
217 with the capability to wake the product from Partial On Mode, as
218 specified in Table , for a total of n such allowances.

Table 2: Partial On Mode Power Allowances

Product Function	Partial On Mode Power Allowance (watts)
Base Allowance for All Products ($P_{\text{PARTIAL_ON_BASE}}$)	2.6
In-use Wi-Fi or Ethernet Interface with Wake Capability (P_{WAKE_i})	1.0
In-use Cellular with Wake Capability (P_{WAKE_i})	2.0
Other In-use LAN (Local Area Network) Interface with Wake Capability (P_{WAKE_i})	1.0

220 **Note:** EPA proposed criteria to recognize efficiency in both Partial On and Idle Modes in the Draft 1
 221 Specification based on data from 20 models (three of which contained network connectivity) from 10
 222 different manufacturers. EPA received limited data from manufacturer stakeholders after the call for data
 223 following the release of the Draft 2 Test Method and, thus, the resulting dataset mostly reflected test data
 224 submitted by Idaho National Laboratory and input from Argonne National Laboratory.

225 In response to Draft 1, stakeholders relayed that the dataset was not robust enough to set requirements
 226 for Partial On and Idle Modes. In revising its proposed efficiency criteria in Table 1, EPA acquired and
 227 tested an additional set of models to create a larger dataset (representing approximately half of the
 228 current EVSE market), which includes products from 13 manufacturers. EPA tested these models
 229 according to the ENERGY STAR EVSE Draft 3 Test Method. Per the proposed criteria, EPA revised the
 230 base allowance from 2.2W in Draft 1 to 2.6W in this Draft 2 to better reflect the top performing products in
 231 its dataset, resulting in a selection of models available from 5 manufacturers.

232 In determining the allowances for network connected products, EPA reviewed the electronic catalogue,
 233 DigiKey, for Ethernet, cellular, and Wi-Fi modules akin to those in use in currently available EVSE to
 234 analyze their power draw. The WiFi and Ethernet modules reviewed consumed less than 1 W of power
 235 and the cellular modules consumed slightly more power at closer to 2W. As such, EPA continues to
 236 propose the allowances for Wi-Fi, Ethernet and LAN network connectivity at 1W and revised in-use cellular
 237 at 2W. As noted in previous stakeholder discussions, other network connected ENERGY STAR qualified
 238 products have also been able to demonstrate a similar power draw at under 1W to deliver network
 239 connectivity in the equivalent Partial On and Idle Modes.

240 EPA understands that many currently available network connected EVSE are not optimized to reflect the
 241 greatest potential energy efficiencies. EPA seeks to encourage a market shift to improve the energy
 242 savings of network connected EVSE by setting stringent, yet viable, allowances, as demonstrated in other
 243 electronic product categories. Finally, EPA removed the adder for occupancy sensor as most models that
 244 EPA analyzed in the market do not contain this feature.

245 3.3 Idle Mode Requirements

246 Note: These requirements refer to the SAE J1772 State C.

247 3.3.1 Measured Idle Mode power (P_{IDLE}), shall be less than or equal to the Maximum Idle Mode Power
 248 Requirement ($P_{\text{IDLE_MAX}}$), as calculated per Equation 2, subject to the following requirements:

249 i. For products with ABC enabled by default, the average Idle Mode power in high and low
 250 illuminance conditions shall be used in place of P_{IDLE} , above.

251 **Equation 2: Calculation of Maximum Idle Mode Power Requirement**

252
$$P_{IDLE_MAX} = (0.25 \times Max\ Current) + P_{IDLE_BASE} + \sum_{i=1}^n P_{IDLE_i}$$

- 253 *Where:*
- 254 ▪ P_{IDLE_MAX} is the Maximum Idle State Power Requirement, in
 - 255 watts;
 - 256 ▪ *Max Current* is the Nameplate Maximum Current; and
 - 257 ▪ P_{IDLE_BASE} is the base Idle Mode power allowance for all
 - 258 products, as specified in Table ;
 - 259 ▪ P_{IDLE_i} is the Idle State power allowance for each applicable
 - 260 product function listed in Table , for a total of n such allowances.

261 **Table 3: Idle State Power Allowances**

Product Function	Idle State Power Allowance (watts, rounded to the nearest 0.1 W for reporting)
Base (P_{IDLE_BASE})	2.6
In-use Wi-Fi or Ethernet Interface with Wake Capability (P_{IDLE_i})	1.0
In-use Cellular with Wake Capability (P_{IDLE_i})	2.0
In-use LAN (Local Area Network) Interface with Wake Capability (P_{IDLE_i})	1.0
In-use Display (P_{IDLE_i})	$(4.0 \times 10^{-5} \times \ell \times A) + 119 \times \tanh(0.0008 \times [A - 200.0] + 0.11) + 6.0$ <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 6.2 of the ENERGY STAR Test Method for Determining Display Energy (Rev. Sep-2015); • <i>tanh</i> is the hyperbolic tangent function; and • The result shall be rounded to the nearest tenth of a watt for reporting.

262 **Note:** Based on an analysis of its expanded dataset, EPA proposes new requirements for Idle Mode in
263 this Draft 2, proposing the same requirements for the base allowance and adders for network connected
264 products as proposed for Partial On Mode. EPA proposes to retain the 0.25 * Max Current, based on the
265 demonstrated relay power consumption of the models in the dataset.

266 EPA continues to propose the in-use display requirements to harmonize with the Version 7.0 ENERGY
267 STAR Displays Specification's On Mode requirements for Signage Displays. Though none of the models
268 in the dataset contain in-use displays, EPA has received stakeholder input that models intended for
269 public, outdoor use contain, or will contain, in-use displays and therefore proposes including an allowance
270 for this feature to incentivize energy efficient implementation. EPA welcomes stakeholder input on the
271 proposed Idle Mode requirements.

272 3.4 Connected Functionality

273 This section presents connected criteria for ENERGY STAR certified EVSE Systems capable of
274 supporting DR. Compliance with this section is optional. ENERGY STAR certified EVSE that comply with
275 all connected criteria will be identified on the ENERGY STAR website as having 'Connected' functionality.

276 **Note:** EPA encourages brand owners to meet ENERGY STAR's connected criteria. Only ENERGY STAR
277 qualified EVSE that meet the criteria in Section 3.4 will be listed on ENERGY STAR's Product Finder as
278 having connected functionality.

279 i. Grid Communications: The product shall include a communication link that is capable of
280 supporting DR. This link shall use open standards, as defined in this specification, for all
281 communication layers.

282 Products that include a communication link that uses Open Charge Point Protocol (OCPP)
283 also comply with this criterion.

284 Note: Effective November 24, 2015 OCPP is being developed by OASIS as the Standard
285 Development Organization with a goal of integrating OCPP with the International
286 Electrotechnical Commission (IEC) framework⁸. EPA is proposing to include OCPP since it is
287 widely used and is in the process of being established as an open standard.

288 **Note:** As the electrification of the US automobile fleet progresses, Demand Responsive EVs will become
289 critically important to enhance grid stability and efficiency and enable increased market uptake of clean
290 renewable sources. EPA recognizes that current EV market penetration is insufficient to enable
291 economically viable DR programs. As such, EPA has proposed in Draft 2 to allow EVSE Systems to be
292 qualified as connected, as long as they are capable of supporting DR. For example, a product that uses a
293 bi-directional open communications protocol, such as OCPP, may not be able to seamlessly support DR,
294 as shipped; but as long as the EVSE is capable of supporting DR through, for example, a product update
295 or a future service, it may be certified as connected.

⁸ <http://www.openchargealliance.org/news/announcement/>

296 ii. Open Access: To enable interconnection with the product over the communication link, an
297 interface specification, application programming interface (API) or similar documentation that
298 is intended to enable DR functionality shall be made readily available.

299 Note: Products that enable direct, on-premises, open-standards based interconnection are
300 preferred, but alternative approaches, where open-standards connectivity is enabled only
301 with use of off-premise services, are also acceptable.

302 iii. Consumer Override: The product shall be capable of supporting DR event override-ability by
303 consumers.

304 **Note:** EPA continues to encourage manufacturers, EVSE brand owners, utilities and DR service
305 providers to enable consumer override-ability whenever possible in order to ensure an acceptable
306 experience both with the EVSE as well as with the DR program. Nonetheless, EPA recognizes that in
307 some instances, DR programs may need to include non-override-able events and revised the requirement
308 to allow for devices that are capable of supporting event override.

309 iv. Capabilities Summary: A ≤250 word summary description of the EVSE system's and/or
310 associated Service Provider's DR capabilities/services shall be submitted. In this summary,
311 EPA recommends noting the following, as applicable:

312 i. Capabilities model, e.g., DR ready, DR upgradeable, DR aggregator, uniquely
313 addressable EVSE.

314 ii. DR Support, e.g., implemented, planned for CY2017.

315 iii. Supported DR modes, e.g., load dispatch, ancillary services, price notification, and price
316 response.

317 iv. Response configurability/flexibility by the consumer and/or Load Management Entity.

318 v. Feedback to Load Management Entity, e.g., verification/M&V, override notification.

319 vi. Measures to limit consumer impacts, if any.

320 **Note:** EPA is proposing to include a short description of the EVSE's DR capabilities to enable brand
321 owners to differentiate their product's DR features; and to inform consumers, utilities and other end users.
322 EPA believes this approach to be appropriate in order to encourage innovation as the market for
323 connected EVSE continues to evolve.

324 **4 TESTING**

325 **4.1 Test Methods**

326 4.1.1 Test methods identified in Table 4 shall be used to determine certification for ENERGY STAR.

327

Table 4: Test Methods for ENERGY STAR Certification

Product Type	Test Method
All Electric Vehicle Supply Equipment	ENERGY STAR Electric Vehicle Supply Equipment Test Method (Rev. Aug-2016)
Electric Vehicle Supply Equipment with In-use Display	ENERGY STAR Test Method for Determining Display Energy (Rev. Sep-2015)

328 **4.2 Number of Units Required for Testing**

329 4.2.1 Representative Models shall be selected for testing per the following requirements:

- 330 i. For certification of an individual product model, the Representative Model shall be equivalent
- 331 to that which is intended to be marketed and labeled as ENERGY STAR.
- 332 ii. For certification of a Product Family, the highest energy using model within that Product
- 333 Family can be tested and serve as the Representative Model. Any subsequent testing failures
- 334 (e.g., as part of verification testing) of any model in the family will have implications for all
- 335 models in the family.

336 4.2.2 A single unit of each Representative Model shall be selected for testing.

337 **4.3 International Market Qualification**

338 4.3.1 Products shall be tested for qualification at the relevant input voltage/frequency combination for

339 each market in which they will be sold and promoted as ENERGY STAR.

340 **5 EFFECTIVE DATE**

341 5.1.1 Effective Date: The Version 1.0 ENERGY STAR Electric Vehicle Supply Equipment specification

342 shall take effect on **TBD**. To qualify for ENERGY STAR, a product model shall meet the ENERGY

343 STAR specification in effect on the model's date of manufacture. The date of manufacture is

344 specific to each unit and is the date on which a unit is considered to be completely assembled.

345 5.1.2 Future Specification Revisions: EPA reserves the right to change this specification should

346 technological and/or market changes affect its usefulness to consumers, industry, or the

347 environment. In keeping with current policy, revisions to the specification are arrived at through

348 stakeholder discussions. In the event of a specification revision, please note that the ENERGY

349 STAR certification is not automatically granted for the life of a product model.

350 **6 CONSIDERATIONS FOR FUTURE REVISIONS**

351 6.1.1 EPA will continue to monitor the market for dc fast, dc slow, and wireless EVSE, and evaluate the

352 opportunity to differentiate such products based on energy performance. Should the potential for

353 significant energy savings exist among these products, EPA will consider expanding the scope of

354 this EVSE specification to include them in a future revision.