ENERGY STAR Program Requirements for Electric Vehicle Supply Equipment Test Method for DC EVSE Draft 2

Comments of ChargePoint
Prepared by Gary Eldridge, P.E., Director of Regulatory Engineering

Content – Page 1, Lines 29-32
Note: One stakeholder noted that the definition of EVSE may limit the scope to exclude products that do not require connection to premises wiring and do not draw energy from conventional AC or DC wiring (e.g., off-grid solar PV EVSE systems do not draw energy from an external source). EPA has removed the term 'premises wiring' from the EVSE definition to account for systems like off-grid PV-supplied EVSE.

Feedback
*I don't believe the requested is needed. The NEC definition for premises wiring system in Article 100 would cover an off-grid solar or other renewable or external source such as a battery, etc. per the definitio*ns:

> Premises Wiring (System). Interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all their associated hardware, fittings, and wiring devices, both permanently and temporarily installed. This includes (a) wiring from the service point ***or power source*** to the outlets ***or (b) wiring from and including the power source to the outlets where there is no service point.***

and informational note:

> Informational Note: Power sources include, but are not limited to, interconnected or stand-alone batteries, solar photovoltaic systems, other distributed generation systems, or generators.

Content – Page 2, Lines 43-45
B) Cabinet/Dispenser Product Configuration – A DC EVSE that has its components in two separate enclosures – one including the power conversion equipment (i.e., cabinet) and another enclosure that connects to the vehicle and has the user interface (i.e., dispenser).

Feedback
This point should take into consideration multiple power cabinets and multiple dispensers thus should not say 'one' and 'another'.

> Cabinet/Dispenser Product Configuration – A DC EVSE that has its **power conversion equipment and user interface/means for vehicle connections** ~~components~~ in ~~two~~ separate enclosures – one including the power conversion equipment

(i.e., cabinet) and another enclosure that connects to the vehicle and has the user interface (i.e., dispenser).

Content – Page 2, Scope (Overall)

Feedback
The scope looks like it was 'carved out' somewhat arbitrarily. I recommend having one column and a uniform requirement. Is there an implied but unstated demarcation between conventional and actively cooled cable systems? Liquid cooled electronics versus passive? The more special rules and cases, the more complex and difficult to test and evaluate and the harder it is to change or reform later. I recommend a single classification for 'DC Charging' (0 to ∞W)? Once arbitrary carve outs are created, it will influence and limit design options to 'fit' within completely arbitrary definitions. Why would we only care about operating efficiency of units under 50 kW? Example, if a manufacturer had a 50kW station with a very poor efficiency rate, they could simply rate the unit 51 kW and qualify for Energy Star while having very poor efficiency. I doubt that is what was intended.

Content – Page 3 lines 59-61
EPA also proposes to exclude pantograph EVSE (chargers with an automated connection system, or ACS) from the scope of the Version 1.1 since standard operating parameters for these product types are still under development. EPA would appreciate stakeholder feedback on this proposal.

Feedback
Why exclude pantograph? There is no reason to not allow a particular technology to be eligible for Energy Star. In Figure 1a, the Pantograph would not be included and neither would the metallic contacts of a conventional vehicle connector (if I understand the diagram correctly). If that is not the case, perhaps the drawing could be clarified.

Content – Page 3, lines 62-65
4.1 Included Products
4.1.1 DC-output EVSE with output power less than or equal to 350 kW.
4.2 Excluded Products
4.2.1 DC-output EVSE with output power greater than 350 kW.

Feedback
Same as item 3 above, why exclude >350kW from scope? Is there a reason why a 400kW charging station should be excluded from being eligible for Energy Star certification? Again, we are creating a design constraint arbitrarily, if I want an Energy Star product, now I must limit my output to 350 kW. So if a customer is asking for Energy Star, their options will be limited.

Content – Page 3, Figure 1a

Feedback
The arrow for input power measurement location implies measuring at the breaker and should be moved to the right where it says 'input' unless it is intended to measure losses in the input wiring. I understand it is intended to measure the losses in the cord of a plug and cord connected product.

Content – Page 4, Line 91
C) DC-input Power: The UUT shall be tested at the nameplate rated voltage.

Feedback
Consider a product rated 500-750 V dc input, 100-80 A. Would that be tested at 500V or 750 V DC? Seems like the intent of line 91 might be 'shall be tested at the highest nameplate rated voltage

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Content – Page 4, Line 95
3) Products that require both DC and AC-input power shall be connected to both applicable input power sources, and both types of input power shall be measured and summed.

Feedback
Under what conditions (of mixed AC and DC)?

Content – Page 5, Note, lines 100-115.
Note: A stakeholder noted that off-grid EVSE need to be tested with an actual solar array or other DC source (e.g., a DC power supply) but if another DC source is used, careful consideration will need to be made on how to simulate the output of a PV panel array, including I-V characteristics. A solar array's output has a region of constant current at low voltages followed by a knee in the curve where output power is at a maximum, leading to a decline in current as voltage approaches the open-circuit voltage. They noted that at a minimum, the test method should specify the highest DC-input voltage and the maximum current, consistent with the manufacturers recommendations in order to protect the EVSE from damage. Another stakeholder noted that it is not practical to ship and setup large numbers of solar panels as a DC source for off-grid DC EVSE systems. EPA received feedback that if a predefined DC-input voltage is specified, it may not represent the overall product efficiency because DC-input power can come from a variety of sources, including PV or batteries. As a result, EPA believes that testing at the nameplate input voltage for products with DC-input may be the most suitable to measure efficiency for DC EVSE intended to operate with varying supply sources. In addition,

EPA has provided for the possibility of DC-output EVSE that take both DC and AC-input voltage.

Feedback
No need to test with solar array. Test can be conducted at specified DC input voltage without respect to its source. The source of the DC does not affect efficiency of the EVSE. Physical reality is that an EVSE cannot be powered directly from PV, the system will always include battery storage or a grid tied inverter or both.

Content – Page 5, Figure 2

Feedback
Not so sure I understand Figure 2 graphic/labeling. I cannot really comment other than it is not clear. The current loop appears to surround L1, L2, N which should give a reading of 0 under normal circumstances.

Content – Page 7, Lines 176-181.
1) Load: The load shall possess the following capabilities:
a) Sink current up to the rated current of the UUT;
b) Voltage of 350 V; for UUTs that are not compatible with 350 V, the voltage shall be the highest compatible with the output requirements of the UUT; and
c) Controllable current levels capable of achieving power levels detailed in Table 5 for AC-input or Table 6 for DC-input.

Feedback
Remove references to voltage and other details and instead state ' the load must be capable of meeting the capability of the charging station and required test conditions.'

Content – Lines 234- 240
Note: A stakeholder suggested a few changes to the requirement that the EVSE be configured as shipped because they are typically configured in the field. They recommended that EPA:
• Require screens display a typical greeting message
• Require that other settings are configured according to manufacturer recommendations
The Draft 1 Test Method specified that the settings are in their as-shipped configuration. The Draft 2 supplements this guidance noting that manufacturer recommendations be used to configure any DC EVSE that offers customizable settings rather than a default configuration.

Feedback
Agree.

Content – Page 10-15, Lines 295-423 (General)

Feedback
I did not see anything about how to treat accessory 'ambient' lighting.

Content – Page 18, Lines 502 through 504.
D) Measurement
1) After the 5-minute warm-up period, the technician shall monitor input current for a period of 5 minutes to assess the stability of the unit under test.

Feedback
Rather than specifying '5 minutes', suggest measuring upon reaching steady state conditions (as in lines 505 through 507).

Content – Page 19, Lines 538 through 554
Note: One stakeholder stated that off-grid DC EVSE must have an internal battery to power internal electronics since there is no utility presence to do so and as a result, testing should be done with the battery enabled for these products. Another manufacturer recommended that EPA specify that:
• The battery should be fully discharged to ensure that batteries do not provide stored energy to the EVSE during the test (since energy from the battery would not be captured by the test), or
• The manufacturer could start and end the test with batteries fully charged if they are willing to accept any potential energy consumption that occurs when the batteries are discharged during the test and then recharged.
They also recommended that in a future specification, EPA could include testing for use of energy storage to power DC EVSE, if this type of product becomes common. EPA will continue to require that an integral battery be disabled, if possible. However, for DC EVSE that contain a battery that is not able to be disabled, EPA has provided additional instructions for testing due to these stakeholder concerns that the battery may cause inaccurate results due to either the product using the battery to provide power, rather than input AC. As a result, for DC EVSE that contain a battery that cannot be disabled, EPA will continue to require that the integral battery be fully charged prior to testing but that the power consumption will continue to be monitored and measured after each modal test until there is no more power draw, in order to account for any energy used to recharge the battery.

Feedback
Suggest substituting DC voltage source for battery that can deliver current in place of the battery. It will be easy to measure the power consumed and the unit will not attempt to charge the 'source' if its voltage is equivalent to a fully charged battery. The specification does not

address the efficiency of battery charging or discharging, so only power used is needed and can be easily measured.

Content – Page 19, Line 556, Table 5

Feedback
How would one test a 7kW DC charging station if the minimum specified test condition is 10 kW? The scope includes DC EVSE down to 0 kW. Imagine that there will be low power home based DC charging in the future. Suggest specifying test levels as a percentage of output power or current, i.e., 25%, 75%, 100% output? Why 350 V? What if a product is not capable of an output less than 500 V because it was built for a specific application like trucks with 800 V battery packs? Suggest percentages of available output voltage.

The test appears to be targeting existing vehicles rather than trying to be agnostic to today's status quo to allow future higher voltage products and vehicles.

With respect to the discussion regarding products with integral batteries. Would it be reasonable to replace the battery with a dc power supply and simply add the power in the same fashion as specified for products that include the ability to have AC and DC input simultaneously? That is a question because it might be naive to think it is that simple, but just a thought. If the source provides the same voltage as a fully charge battery, the unit would not attempt to charge the battery (or DC source in this case).

Content – Page 15, Line 409-410
1) Products with an Occupancy Sensor shall be positioned facing away from any testers, or have the sensor covered or otherwise disabled to be in an open position for the duration of the test.

Feedback
Why is it necessary to interact with an occupancy sensor?

Content – Page 16, Line 441 - 443
4) Determine the maximum available output power of the UUT by using the VEM to communicate with the UUT via the protocol defined for the connector type intended to ship with the product (e.g., for CCS connector type, the VEM shall communicate via the SAE J1772 pilot signal).

Feedback
Suggest taking the specification to be the maximum available output power rather than attempting to determine with the use of external test equipment.

Content – Page 20, Lines 557 through 562
Note: Per the proposed limitation of scope, EPA has removed the 350 kW test condition from Table 5 since the maximum available output power for a DC EVSE with a rated output of 350 kW will be captured in Loading Condition 5. For the maximum power, EPA is proposing a voltage that is calculated from the maximum power by dividing by 0.7 A and adding 300 V, to provide a voltage proportional to power, and results in 800 V at 350 kW. EPA would appreciate stakeholder feedback on the equation to calculate the appropriate voltage at the maximum output power loading condition.

Feedback
Suggest conditions based on percentages of maximum rather than maximum followed by specific values like 30, 15, and 4 A.

Content – Page 20, Lines 564-571
Note: A stakeholder noted that off-grid solar-powered DC EVSE are not capable of delivering precise loading conditions, instead they deliver the current available from the sun which varies between ~ 0 W - 20 kW. They suggested that EPA add a loading condition of 0 W to Table 3 for off-grid DC EVSE. They also suggested that EPA consider DC-input EVSE in the measurements and calculated values that need to be recorded during Operation Mode testing.

EPA is proposing to reuse the test table from the current AC-output EVSE test method, except since DC570 input EVSE are expected to be driven by a solar PV array which acts as a current source, it will be the input current that will be varied rather than the load. The 0 W condition is already tested as Idle State.

Feedback
Since the test program does not include solar powered systems (the PV part) simply substitute a proper DC source for the PV array.

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