

Electric Vehicle Supply Equipment Criteria

Criteria Checklist

3002018754

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Technical Update, December 2020

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ABSTRACT

In early 2020, EPRI established the Electric Transportation Infrastructure Qualification Working Group (QWG). This public working group was designed to serve as a forum to gather industry input on a set of electric vehicle supply equipment qualifications. These qualifications will be used to develop a vetted equipment list that will be published on this web portal. The working group is open to all-electric vehicle stakeholders. This report documents the work to date of the public working group and captures feedback on the various criteria being proposed.

Keywords

Electric vehicle charging

Compliance

Standards based

Criteria

ACRONYMS AND ABBREVIATIONS

AC – alternating current

ANSI – American National Standards Institute¹

CANENA - Council for Harmonization of Electrotechnical Standards of the Nations in the Americas²

CCS - combined coupler system

CISPR - International Special Committee on Radio Interference³

DC - direct current

DIN – German Institute for Standardization⁴

EMC – electromagnetic compatibility

EMF - electromagnetic fields

ESP – energy service provider

EV - electric vehicle

EVSE - electric vehicle supply equipment

EVSP - electric vehicle service provider

HAN – home area network

ICNIRP – International Commission on Non-Ionizing Radiation Protection⁵

IEC – International Electrotechnical Commission⁶

IEEE – Institute of Electrical and Electronic Engineers⁷

IP – internet protocol

ISO – International Standardization Organization⁸

¹ https://www.ansi.org/

² <u>https://www.canena.org/</u>

³ <u>https://www.iec.ch/dyn/www/f?p=103:7:0::::FSP_ORG_ID:1298</u>

⁴ <u>https://www.din.de/en/about-standards/din-standards</u>

⁵ <u>https://www.icnirp.org/</u>

⁶ <u>https://www.iec.ch/homepage</u>

⁷ <u>https://www.ieee.org/</u>

⁸ <u>https://www.iso.org/home.html</u>

- ITU International Telecommunications Union9
- NEC National Electric Code¹⁰
- NCWM National Conference on Weights and Measures¹¹
- NFPA National Fire Protection Association¹²
- NHTSA National Highway Traffic Safety Administration¹³
- NIST National Institute of Standards and Technology¹⁴
- OCPI Open Charge Point Interface¹⁵
- OCPP Open Charge Point Protocol¹⁶
- OSHA Occupational Safety and Health Administration¹⁷
- OWM Office of Weights and Measures¹⁸
- PLC power line carrier (communication)
- SAE SAE International (acronym previously stood for Society of Automotive Engineers)¹⁹
- UL Underwriters Labs²⁰
- WPT wireless power transfer

⁹ <u>https://www.itu.int/en/Pages/default.aspx</u>

¹⁰ <u>https://www.nfpa.org/electricalsolutions</u>

¹¹ https://www.ncwm.com/

¹² <u>https://www.nfpa.org/</u>

¹³ <u>https://www.nhtsa.gov/</u>

¹⁴ https://www.nist.gov/

¹⁵ <u>https://evroaming.org/</u>

¹⁶ <u>https://www.openchargealliance.org/</u>

¹⁷ https://www.osha.gov/

¹⁸ <u>https://www.nist.gov/pml/weights-and-measures/about-owm</u>

¹⁹ <u>https://www.sae.org/</u>

²⁰ <u>https://www.ul.com/</u>

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1 OVERVIEW

There is a need to help support the development of standards and practices for charging equipment deployment to help fill gaps for light duty vehicle electrification and establish requirements for medium and heavy-duty electric vehicle charging infrastructure. EV charging equipment needs to meet relevant standards for safety and interoperability to ensure that the equipment is safe to use, rugged, interoperable, and meets all electrical and applicable networking standards. Utilities and other stakeholders may have requirements or opportunities to support deployment of infrastructure for electric vehicles and non-road electric equipment through direct deployments, incentive programs, rebates, and other programs. Where light duty infrastructure is commercially available, and standards are mostly established, there may still be gaps in the overall functionality, compatibility, and verification of the adherence of electric vehicle supply equipment (EVSE) to applicable standards, as well as its interoperability.

In early 2020, EPRI established the Electric Transportation Infrastructure Qualification Working Group (QWG). This public working group was designed to serve as a forum to gather industry input on a set of electric vehicle supply equipment qualifications. The work on these qualifications to date is documented in this report. The working group was opened to all interested electric vehicle stakeholders and has met several times in 2020²¹.

The purpose of the public working group was to:

- Inform and involve electric power system and electric power sector stakeholders in an EPRI project to develop a qualifications matrix for electric vehicle charging equipment
- Seek industry input on a set of qualifications for electric vehicle supply equipment (EVSE) to be deployed in association with utility programs. The Qualifications will be consolidated in a database targeted to identify if equipment is safe, properly functioning and appropriately features the integration issues facing electric power stakeholders, utilities, vendors, and the public in reaction to a dynamic and evolving needs for EV charging participants with impact on customers of electricity products and services.
- Seek stakeholder input on a process to qualify and/or certify equipment to be qualified according to the developed criteria.

EPRI intends to use the criteria found in this report to vet electric vehicle charging equipment and to publish results of that vetting on the public facing web portal noted above.

Assumptions

The following assumptions were used in development of the criteria:

²¹ <u>https://www.epri.com/pages/sa/EVSE_Qualification_Working_Group</u>

- The developed criteria were intended to apply to AC and DC charging hardware (separate sections) designed for use in North America
- The criteria are intended to cover electric vehicle supply equipment for vehicles that follow SAE J1772 and/or CHAdeMO charging interface protocols
- The criteria are a superset of those that may be needed in a particular application. It is left to the used of the vetted equipment list to decide which criteria are applicable for their application.
- Where possible we have avoided including optional equipment features within the criteria list (such as specific power level requirements, cable length, etc.)
- Some qualification elements are only applicable if an EVSE is so equipped (for example, payment module qualifications would only be applicable for a device that has a payment module installed)
- This is a living list and it is expected that criteria will be added/deleted/update over time

How the Qualification List was Developed

Working with the EPRI project funders, a short list of criteria was developed to be vetted by the public working group and to act as a basis for the work. It should be understood that the criteria listed **are not mandatory** – a purchaser of equipment would decide what criteria they consider mandatory for their procurement.

- Where possible, derived from existing standards or from industry input
- Working group input is needed where standards are lacking
- Need to be rigorous such that compliance metrics can be established

What is Excluded from this Effort?

It is expected that this document will be periodically updated to reflect changes in electric vehicle charging and industry direction. In order to limit the scope of the effort, the following elements were excluded from consideration at this time.

- Hardware installation is not covered (installation requirements, mounting, physical size, etc.)
- Americans with Disabilities Act (ADA) compliance cannot be guaranteed at equipment level and so is not directly addressed by these criteria. The vetting process will ask the vendor if product documentation supports ADA installation.
- Reverse power flow (also known as vehicle to grid) is not covered by these criteria (SAE J3072, SAE J2847/3, IEEE 1547.1, UL 9741)

2 THE CRITERIA DEVELOPMENT PROCESS

The base list of AC and DC criteria has been reviewed with a public stakeholder group. Each criteria element has been discussed with the public working group. Comments received are summarized in section 3 for AC charging criteria and section 4 for DC charging criteria. Complete notes as taken on public calls (including email correspondence input) are provided in section 5.

For each criteria the goal has been to develop a well-defined metric or metrics for that criteria and whenever possible tie those criteria back to industry standards and practices. In some cases, there remains no simple way to vet that particular criteria. In those cases, an attempt has been made to describe a process of vetting that can be accepted on a consensus basis by industry stakeholders.

In sections 3 and 4, for each criteria a draft Vetting Method is listed. These are still a work in progress and subject to stakeholder review but reflect a best attempt at aggregating comments received from stakeholders at the public working group meetings. It is anticipated that these will be revised and updated as needed in early 2021 for application to equipment vetting.

3 AC CHARGING ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) QUALIFICATION CHECKLIST

#	Qualification	Description	Vetting Method/Notes
	EVSE ELECTRICAL		
1-1	Safety requirements	Unit listed by qualified Nationally Recognized Test Lab (NRTL) to UL 2594 ²² ; will include other UL standards as prescribed by the NRTL; other standards likely to be referenced: UL 2231-1, UL 2231-2, UL 2251, UL 1998	Vendor to provide name of NRTL used and a copy of the Certificate of Compliance. Proprietary information should not be included in the provided materials. The information should include a list of the UL standards used to vet the product and models covered by the listing. For Batch listed products, information must include serial number range or other product marking data that indicates equipment that falls under the batch listing. Field listing of equipment is not recognized in this process since it seeks to pre-qualify equipment.
Vettin NRTL	g method has been update s certified by ANSI and OS	ed to reflect input from the public working g SHA will be recognized	roup.
1-2	Connector and charging interface standard	EVSE charging interface must be compliant with SAE J1772 ²³	Vendor to provide documentation describing due diligence done to confirm compliance.
It was clean due d	It was recognized that this is a critical element of the criteria, but that industry has not developed a clean way to address this to date. Will rely on vendor expressing how they have addressed this as a due diligence effort. Recognition that problems with interface can be due to vehicle behavior.		
1-3	Power quality criteria	EVSE must be compliant with applicable portions of SAE J2894/1 ²⁴ based on testing as described in SAE J2894/2 ²⁵	Need to compare UL 2231- 2 and J2894 – are there elements that need to be included here?
UL tes requir	sting conducted as part of es tests that cover several	UL 2231-2 for testing of the charge current aspects of the J2894 testing. Since AC E	interruption device (CCID) VSE are pass through

²² https://standardscatalog.ul.com/standards/en/standard_2594_2

²³ <u>https://www.sae.org/standards/content/j1772_201710/</u>

²⁴ https://www.sae.org/standards/content/j2894/1_201901/

²⁵ https://www.sae.org/standards/content/j2894/2_201503/

#	Qualification	Description	Vetting Method/Notes	
device	es, J2954 will have limited	applicability. Need to compare UL 2231-2	and J2894 to understand if	
there	are elements of J2894 not	covered.		
1-4	RF	Compliance with Federal	Vendor to provide proof of	
	emissions/susceptibility	Communications Commission (FCC)	compliance. FCC	
	requirements	Part 15; Code of Federal Regulations,	database ²⁷ or vendor to	
		$Example 17. Part 15^{20} (47 CFR 15)$	provide appropriate	
Lindo	rate ad that a product cold i	n the LIC must be compliant	documentation	
	Stood that a product sold i	Compliant with requirements of	Vender provided	
1-5	Electrical - Installation	National Electric Code: National Fire	documentation	
		Protection Association (NEPA) 70	documentation	
		$(NEC)^{28}$ focus on article 625		
Was a	argued that a product that	qualified to UL 2594 would be compliant wi	th NEC requirements	
1-6	Energy Efficiency	Environmental Protection Association	Verify listed on EPA	
		(EPA) EnergyStar for EVSE ²⁹ ; EPA	EnergyStar website ³⁰	
		program related to energy efficiency of		
		end use products; reference current		
		EnergyStar EVSE document		
Option	nal criteria			
	EVSE PHYSICAL			
2-1	Enclosure suitable for	Enclosure rating; National Electrical	Vendor provided	
	application	Manufacturers Association (NEMA) ³¹ or	documentation	
		Ingress Protection (IP)		
		a. Indoor – any NEMA rating		
		D. Outdoor – 3R minimum		
		compliance with NEMA or IP standards		
L oft to	purchaser if higher level (as noted, ANSI/IEC 00529		
2_2	Operating Temperature	Fourinment must be canable of normal	Temperature range as	
2-2	Range	operation over the temperature of xx	specific in LII 2594 listing	
	Range	deg E to XXX deg E (-30 deg C to 40		
		deg C)		
UL 2594 runs tests at up to 40degC				
2-3	Physical Security	If enclosure can be opened without a	Have not decided how to	
		tool – how is it secured?	address this criterion	
Live p	Live parts access is covered in safety testing; is this referring to the enclosure and for what purpose?			
2-4	Cybersecurity	Protection of data and integrity of	Have not decided how to	
		firmware and operation of EVSE	address this criterion	
Input	Input from August 11, 2020			
No sta	andards – there are some	guidelines and Department of Energy funde	ed projects looking at this –	
but no	ot fully developed at this			
2-5	Durability	Paint, materials, displays	Have not decided how to	
			address this criterion	

²⁶ <u>https://www.govinfo.gov/app/details/CFR-2010-title47-vol1/CFR-2010-title47-vol1-part15</u>

²⁷ <u>https://www.fcc.gov/oet/ea/fccid#helpSection</u>

²⁸ <u>https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=70</u>

²⁹ <u>https://www.energystar.gov/products/other/evse</u>

³⁰ <u>https://www.energystar.gov/products/other/ev_chargers</u>

³¹ <u>https://www.nema.org/Products/Documents/nema-enclosure-types.pdf</u>

#	Qualification	Description	Vetting Method/Notes
Discu	ssion focused on UL 2594	requirements and if they covered this suffi	ciently. Question – is this
about	appearance or functional	durability?	
2-6	Minimum Display	Power indicator; graphic display?	Have not decided how to
	Requirements		address this criterion
UL 25	594 has a fault condition di	splay requirement; Discussion that this mig	ht be considered a feature
and n	ot a criterion		
2-7	American With	Must be capable of being installed in	Vendor documentation
	Disabilities Act (ADA)	compliance with ADA requirements	(Does manual include ADA
			installation instructions?)
note t	hat ADA is mostly an insta	llation driven requirement, but equipment r	nust provide features to
suppo	ort ADA		
	EVSE PAYMENT and	This focuses on requirements for local	
	AUTHENTICATION	hardware	
	SYSTEMS		
3-1	Devices	Do we need to list specific interfaces	Have not decided how to
		(such as touchless credit card payment	address this criterion
		hardware)?	
Discu	ssion that this might be co	nsidered a feature and not a criterion	
3-2	Protocol	If payments system uses an	Have not decided how to
		independent network, what protocol	address this criterion
		does it use?	
Exped	ct this will be vendor deper	ident	
3-3	Security	Local hardware security requirements	Have not decided how to
		for payment system	address this criterion
Is PC	I compliance applicable at	the hardware level? Should this be combin	ned with network
requir	ements? Noted that PCI c	ompliance at system level would cover this	. Discussion that this might
be co	nsidered a feature and not	a criterion	
3-4	Minimum payment		Have not decided how to
	options		address this criterion
These	e may be covered under St	ate Specific requirements	
	NETWORKING		
4-1	EVSE Data Available –	Detailed description of data that is	Have not decided how to
	Format	required to be collected by the EVSE	address this criterion
		and format of reporting of the data	
May r	need to distinguish collecting	ng versus reporting of data. For reference -	see Section 6 for the Idaho
Natio	hal Lab requirements list fr	om the DOE EV Project circa 2011. Califor	mia has proposed data
requir	ements – see criteria 8-9		
0			1-1-
Sugge	Estion that we use Open C	harge Point interface ²² (UCPI) for real time	uala
4-2	EVSE Data –	How is data communicated in reference	Have not decided now to
			aduress this criterion
Need	network level)	food into this	
1 d 2	Stanuaru for criteria 4-1 to	Heat or evetem energian table for	Have not decided here to
4-3	Location wap with	Host or system operator tools for	Have not decided how to
	Realtime Data – Utility	charging site management	aduress this criterion
No			
	nsensus on approach.		
4-4	Location Map with	Consumer facing map tools	Have not decided how to
			aduress this criterion
NL			
No consensus on approach.			

³² <u>https://evroaming.org/</u>

#	Qualification	Description	Vetting Method/Notes	
4-5	Phone Support	Phone support services requirements	Have not decided how to	
	Services		address this criterion	
On lis	On list due to California requirements – could move to State Specific criteria			
4-6	Cloud Based API	API features and functions	Have not decided how to	
	Features for Utility	requirements	address this criterion	
	Interaction - Data			
Could	this just require an API wi	thout specifics?		
4-7	Cloud Based API	API demand response requirements	Have not decided how to	
	Features for Utility		address this criterion	
	Interaction – Demand			
	Response			
No sta	andard to reference			
Open	ADR2.0b?			
This				
Discu	vouid be for utility demand	for three different protocolor OpenADB m	av he limiting	
		ADL notification requirements	Hove not desided how to	
4-0	Eastures for Litility	Arthouncation requirements	address this criterion	
	Interaction – User			
	Event Notification			
Discu	ssion of what would be ap	nopriate for this criterion – what is utility lo	oking for? A number of	
option	is related to communicatio	ns protocols. Needs more discussion.		
4-9	EVSE to Network	Protocol used to manage EVSE from by	Have not decided how to	
	Communications -	a charging network	address this criterion	
	Protocol	5 5		
Exam	ple: Open Charge Point P	rotocol Version 1.6?		
Open	Charge Alliance - certified	d via OCA compliance tool? If OCPP is refe	erence, need to be clear	
what	portion of protocol is refere	enced		
4-10	EVSE to Network	Network security requirements	Have not decided how to	
	Communications –		address this criterion	
	Security -			
	Communications			
NIST	800-53? New seeing solici	tation that are requiring Open Charge Allia	nce security tool compliance	
4-11	EVSE to Network	Specific data security requirements	Have not decided how to	
	Communications –		address this criterion	
	Security - Data			
4.40		Out the second s		
4-12	EVSE to Network	System physical security requirements	Have not decided now to	
	Socurity Physical		address this chienon	
-	Security – Physical			
1 12	EV/SE to Network	Pomoto firmwara undating conchility	Have not desided how to	
4-13		and related requirements	address this criterion	
	Remote Firmware			
	Maintenance			
How is this handled when EV/SE maker and Network operator are not the same company?				
In discussion was mentioned that some customers are requesting data paths that are by definition				
unsecure and will have to rely on physical security				
4-14	Roaming	Requirements for roaming	Have not decided how to	
		,	address this criterion	
Cover	red by state specific langua	age for California		

#	Qualification	Description	Vetting Method/Notes	
OCPI	- primary use is roaming;	NREL/AFDC starting to use this for data of	n locations, by Plugshare	
(Reca	rgo) for real time station st	tatus – may be a good standard to align are	ound for roaming	
Discu	ssion noted that making th	is a requirement – can be tricky in that it ta	kes more than just a single	
vendo	or to make this happen; is (DCPI best solution or better to leave open?		
T 1.1.1		and the second		
I his is	This is happening organically as network vendors develop linking agreements.			
	Customer Experience	I nese are operation related		
		this list		
5-1	Customer Experience –	Required diagnostic	Have not decided how to	
	Usability - Diagnostics		address this criterion	
Is this	local or network based -	should this be moved under network?		
5-2	Customer Experience –	Uptime requirements	Have not decided how to	
	Usability – Uptime		address this criterion	
How o	defined?			
Discu	ssion - Seeing uptime requ	iirements in solicitations but generally vagu	ue as to what it means; often	
uses	cell network or other parts	of network uptime is reported; There is als	o a tie with maintenance and	
upkee	ep – being proactive to help	address this		
5-3	Customer Experience –	Repair response time to repair	Have not decided how to	
	Usability – Repair		address this criterion	
Would	need detailed definition.	Could be hardware related or network rela	ted or both.	
	In-Field Feedback from			
	Equipment			
	Performance			
6-1	IBD		Have not decided how to	
			address this criterion	
	Peliability			
7 1	MTRE	Some form of equipment reliability	Have not decided how to	
7-1		specification?	address this criterion	
Would	this be for bardware only	or bardware and network?		
would this be for hardware only of hardware and hetwork?				
Discu	ssion - Even if you specifie	ed MTBE – it isn't likely to result in better fie	d performance – there you	
need monitoring – sensors and inspection to achieve good MTBF in the field				
General construction requirements are covered in NRTL listing (such as flammability requirements)				
Reliat	Reliability is different than "damage" or abuse in the field – reliability would be using the product as			
intend	led and looking at its life;	,	0	

State Specific Requirements for AC Charging

State of California

As these are being mandated by the state, the working group did not spend much time in discussion of these; compliance will be mandated by state

#	Qualification	Description	Vetting Method
	Public EVSE	Some requirements are not yet required –	
	Equipment with a	should they be included?	
	Network		

#	Qualification	Description	Vetting Method
8-1	Labeling	California Code of Regulations Chapter 8.3,	Vendor provided
		paragraph 2360.1 ³³ , ³⁴ ; labeling	documentation
		requirements; required by July 1, 2023	
8-2	Fee Disclosure	California Code of Regulations Chapter 8.3,	Vendor provided
		paragraph 2360.1; fee disclosure	documentation
	T 11 E 11 1	requirements; required by July 1, 2023	
8-3	I oll Free Number	California Code of Regulations Chapter 8.3,	Vendor provided
		paragraph 2360.2; toll free number	documentation
		effer luly 1, 2022, shall somely	
0 /	Subscription	California Code of Regulations Chapter 8.2	Vender provided
0-4	Subscription	paragraph 2360.2: mombarship or	
		subscription not required to use charging	documentation
		equipment: An AC EV/SE installed on or	
		after July 1 2023 shall comply	
8-5	Credit Card	California Code of Regulations Chapter 8.3.	Vendor provided
	Reader	paragraph 2360.2; credit card reader	documentation
		requirements; An AC EVSE installed on or	
		after July 1, 2023, shall comply	
8-6	Roaming	California Code of Regulations Chapter 8.3,	Vendor provided
	Agreements	paragraph 2360.3; EVSP requirements for	documentation
		roaming agreements; Required by no later	
		than July 1, 2021	
8-7	Reporting	California Code of Regulations Chapter 8.3,	Vendor provided
	Requirements	paragraph 2360.4; extensive list of	documentation
		Information that must be provided to the	
		operating or intending to operate one or	
		more publicly available Level 2 EVSE	
		installed in California: Complex set of	
		reporting deadlines	
8-8	NIST Handbook	California Department of Food and	Vendor provided
	44 Compliance	Agriculture, Division of Measurement	documentation
		Standards ³⁵ - Electric Vehicle Fueling	
		Systems Specifications in the CCR Title 4,	
		§§ 4001 and 4002.11.; requires compliance	
		with NIST Handbook 44 sections pertaining	
		to sale of electricity as a fuel (as amended	
		by the State of California); include metering	
		accuracy requirements and timeline for	
8.0	California Energy	Collifornia Enorgy Commission proposed	Vandar provided
0-9		data collection requirements: Title 20:	documentation
	Title 20 EV/SE	Docket number 18-OIR-01: paragraph 1386	documentation
	Data		
	Requirements	See section 7 for the text of the	
		Commission proposal.	

³³ California Air Resources Board, <u>https://ww2.arb.ca.gov/sites/default/files/2020-06/evse_fro_ac.pdf</u>

³⁴ <u>https://ww2.arb.ca.gov/our-work/programs/electric-vehicle-supply-equipment-evse-standards</u>

³⁵ <u>https://www.cdfa.ca.gov/dms/regulations.html</u>

4 DC CHARGING ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) QUALIFICATION CHECKLIST

#	Qualification	Description	Vetting Method
	EVSE ELECTRICAL		
1-1	Safety requirements	Unit must be listed by qualified Nationally Recognized Test Lab (NRTL) to UL 2202 ³⁶ ; will include other UL standards as prescribed by the NRTL; other standards likely to be referenced: UL 2231-1, UL 2231-2, UL 2251, UL 1998	Vendor to provide name of NRTL used and a copy of the Certificate of Compliance. Proprietary information should not be included in the provided materials. The information should include a list of the UL standards used to vet the product and models covered by the listing. For Batch listed products, information must include serial number range or other product marking data that indicates equipment that falls under the batch listing. Field listing of equipment is not recognized in this process since it seeks to pre-qualify equipment.
Vettin NRTL	g method has been update s certified by ANSI and OS	ed to reflect input from the public working g SHA will be recognized	roup.
1-2	Connector and charging interface standard	EVSE charging interface must be compliant with SAE J1772 ³⁷ EVSE charging interface must be compliant with CHAdeMO	Vendor to provide documentation describing due diligence done to confirm compliance.
It was recognized that this is a critical element of the criteria, but that industry has not developed a clean way to address this to date. Will rely on vendor expressing how they have addressed this as a due diligence effort. Recognition that problems with interface can be due to vehicle behavior.			
CHAd	leMO has a compliance ce	rtification process which could be reference	ed.
1-3	Power qualify criteria	EVSE must be compliant with applicable portions of SAE J2894	Vendor provided documentation
UL testing conducted as part of UL 2231-2 for testing of the charge current interruption device (CCID) requires tests that cover several aspects of the J2954 testing. Need to compare UL 2231-2 and J2894 to understand if there are elements of J2894 not covered.			

³⁶ <u>https://standardscatalog.ul.com/standards/en/standard_2202_2</u>

³⁷ https://www.sae.org/standards/content/j1772_201710/

#	Qualification	Description	Vetting Method	
Discu	ssion - Suggestion that we	add <5% harmonics per IEEE 519; J2894	has a specification for	
harmo	harmonics – IEEE 519 is more focused on the electric grid power quality and not product power quality			
1-4	RF	Compliance with Federal	Vendor to provide proof of	
	emissions/susceptibility	Communications Commission (FCC)	compliance. FCC	
	requirements	Part 15; Code of Federal Regulations,	database ³⁹ or vendor to	
		Litle 47, Part 15 ³⁶ (47 CFR 15)	provide appropriate	
			documentation	
Unde	rstood that a product sold I	n the US must be compliant		
1-5	Electrical - Installation	Compliant with requirements of	Vendor provided	
		National Electric Code; National Fire	documentation	
		$(NEC)^{40}$ focus on article 625		
Was	argued that a product that ((NEC), locus on ance 025	h NEC requirements	
1 6	Energy Efficiency	Environmental Protection Association	Verify listed on EPA	
1-0		(EPA) EnergyStar for EVSE 41 EPA	EnergyStar website	
		program related to energy efficiency of	Energyotal website	
		end use products: reference current		
		EnergyStar EVSE document		
Enero	v Star for DCFC still a wor	k in progress		
	EVSE PHYSICAL			
2-1	Enclosure suitable for	Enclosure rating; National Electrical	Vendor provided	
	application	Manufacturers Association (NEMA) ⁴² or	documentation	
		Ingress Protection (IP)		
		a. Indoor – any NEMA rating		
		 b. Outdoor – 3R minimum 		
		Compliance with NEMA or IP standards		
		as noted; ANSI/IEC 60529		
Left to	purchaser if higher level o	of protection is needed for outdoor units		
2-2	Minimum Operating	Equipment must be capable of normal	Temperature range as	
	Temperature Range	operation over the temperature of xx	specific in UL 2202 listing	
		deg F to XXX deg F (xx deg C to XXX		
		deg C)		
2.2	Dhysical Security	If analogues can be anonad without a	Hove not decided how to	
2-3	Physical Security	tool bow is it secured?	Have not decided now to	
Livon	arta agogga ia governed in a	of the testing: is this referring to the apples	address this chienon	
	Cyberecourity	Brotaction of data and integrity of	Have not desided how to	
2-4	Cybersecurity	firmware and operation of EVSE	address this criterion	
Input	Tirmware and operation of EVSE address this criterion			
No standards – there are some guidelines and Department of Energy funded projects looking at this –				
but not fully developed at this				
2-5	Durability	Paint, materials, displays	Have not decided how to	
			address this criterion	
Discussion focused on UL 2202 requirements and if they covered this sufficiently. Question – is this				
about appearance or functional durability?				

³⁸ <u>https://www.govinfo.gov/app/details/CFR-2010-title47-vol1/CFR-2010-title47-vol1-part15</u>

³⁹ <u>https://www.fcc.gov/oet/ea/fccid#helpSection</u>

⁴⁰ <u>https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=70</u>

⁴¹ <u>https://www.energystar.gov/products/other/evse</u>

⁴² <u>https://www.nema.org/Products/Documents/nema-enclosure-types.pdf</u>

#	Qualification	Description	Vetting Method	
2-6	Minimum Display	Power indicator; graphic display?	Have not decided how to	
	Requirements		address this criterion	
UL 22	202 may have requirements	s; Discussion that this might be considered	a feature and not a criterion	
2-7	American With Disabilities Act (ADA)	Must be capable of being installed in compliance with ADA requirements43	Vendor documentation (Does manual include ADA installation instructions?)	
note t suppo	hat ADA is mostly an insta ort ADA	llation driven requirement, but equipment r	nust provide features to	
	EVSE PAYMENT and	This focuses on requirements for local		
	AUTHENTICATION SYSTEMS	hardware		
3-1	Devices	Do we need to list specific interfaces (such as touchless credit card payment hardware)?	Have not decided how to address this criterion	
Discu	ssion that this might be co	nsidered a feature and not a criterion		
3-2	Protocol	If payments system uses an independent network, what protocol does it use?	Have not decided how to address this criterion	
Exped	ct this will be vendor deper	ident		
3-3	Security	Local hardware security requirements for payment system	Have not decided how to address this criterion	
Is PC requir be co	Is PCI compliance applicable at the hardware level? Should this be combined with network requirements? Noted that PCI compliance at system level would cover this. Discussion that this might			
3-4	Minimum payment options		Have not decided how to address this criterion	
These	e may be covered under St	ate Specific requirements		
	NETWORKING			
4-1	EVSE Data Available – Format	Detailed description of data that is required to be collected by the EVSE and format of reporting of the data	Have not decided how to address this criterion	
May need to distinguish collecting versus reporting of data. For reference - see Section 6 for the Idaho National Lab requirements list from the DOE EV Project circa 2011. California has proposed data requirements – see criteria 8-9 Suggestion that we use OCPI for real time data				
4-2	EVSE Data – communication	How is data communicated?	Have not decided how to address this criterion	
Need	standard for criteria 4-1 to	feed into this.		
4-3	Location Map with Realtime Data – Utility Focused	Host or system operator tools for charging site management	Have not decided how to address this criterion	
No co	nsensus on approach.			
4-4	Location Map with Realtime Data – Consumer Focused	Consumer facing map tools	Have not decided how to address this criterion	
No co	nsensus on approach.			
4-5	Phone Support Services	Phone support services requirements	Have not decided how to address this criterion	
On lis	On list due to California requirements – could move to State Specific criteria			

⁴³ <u>https://www.ada.gov/</u>

#	Qualification	Description	Vetting Method	
4-6	Cloud Based API	API features and functions	Have not decided how to	
	Features for Utility	requirements	address this criterion	
	Interaction - Data			
Could	I this just require an API wi	thout specifics?		
4-7	Cloud Based API	API demand response requirements	Have not decided how to	
	Features for Utility		address this criterion	
	Interaction – Demand			
	Response			
No sta	andard to reference			
Open	ADR2.0b?			
This v	vould be for utility demand	response programs		
Discu	ssion that IEEE 1547 allow	/ for three different protocols; OpenADR m	ay be limiting	
4-8	Cloud Based API	API notification requirements	Have not decided how to	
	Features for Utility		address this criterion	
	Interaction – User			
Di	Event Notification			
Discu	ssion of what would be ap	propriate for this criterion – what is utility lo	oking for? A number of	
option	IS related to communicatio	ns protocols. Needs more discussion.		
4-9	EVSE to Network	Protocol used to manage EVSE from by	Have not decided now to	
	Communications -	a charging network	address this chienon	
- Even	Protocol	rete cel Vareiere 1 62		
Exam	Charge Alliance contified	totocol version 1.0?	proposi pood to bo algor	
Open	Charge Alliance – Certilled	a via OCA compliance tool? II OCPP is rele	erence, need to be clear	
	EVSE to Notwork	Notwork acquirty requirements	Have not desided how to	
4-10		Network security requirements	address this criterion	
	Communications –			
	Communications			
NIST	800-532 New seeing solici	tation that are requiring Open Charge Allia	nce security tool compliance	
4-11	EVSE to Network	Specific data security requirements	Have not decided how to	
	Communications –		address this criterion	
	Security - Data			
	booding Data			
4-12	EVSE to Network	System physical security requirements	Have not decided how to	
1.12	Communications –		address this criterion	
	Security – Physical			
4-13	EVSE to Network	Remote firmware updating capability	Have not decided how to	
	Communications –	and related requirements	address this criterion	
	Remote Firmware			
	Maintenance			
How i	s this handled when EVSE	maker and Network operator are not the s	ame company?	
In dise	cussion was mentioned tha	at some customers are requesting data pat	hs that are by definition	
unsecure and will have to rely on physical security				
4-14	Roaming	Requirements for roaming	Have not decided how to	
	address this criterion			
Cover	Covered by state specific language for California			
		-		
OCPI	OCPI – primary use is roaming; NREL/AFDC starting to use this for data on locations, by Plugshare			
(Reca	(Recargo) for real time station status – may be a good standard to align around for roaming			

#	Qualification	Description	Vetting Method
Discu	ssion noted that making th	is a requirement – can be tricky in that it ta	kes more than just a single
vendo	or to make this happen; is (OCPI best solution or better to leave open?)
I his is	s happening organically as	network vendors develop linking agreeme	nts.
	Customer Experience	I hese are operation related	
		requirements – not sure they belong in	
5 4	Overte en Even enion es	tnis list	
5-1	Lisability Diagnostics	Required diagnostic	Have not decided now to
le thie	local or notwork based	should this he moved under network?	
5.2	Customor Experience		Have not decided how to
5-2		Optime requirements	address this criterion
How	lefined?		
Discus	sion - Seeing untime regu	irements in solicitations but generally yag	le as to what it means: often
	cell network or other parts	of network untime is reported. There is also	a tie with maintenance and
unkee	$p_{\rm p}$ – being proactive to help	address this	
5-3	Customer Experience –	Repair response time to repair	Have not decided how to
00	Usability – Repair		address this criterion
	Response		
Would	need detailed definition.	Could be hardware related or network rela	ted or both.
	In-Field Feedback from		
	Equipment		
	Performance		
6-1	TBD		Have not decided how to
			address this criterion
	Reliability		
7-1	MTBF	Some form of equipment reliability	Would this be for hardware
		specification?	only or hardware and
			network?
Would	I this be for hardware only	or hardware and network?	
Discu	ssion - Even if you specifie	ed MTBF – it isn't likely to result in better fie	eld performance – there you
need	monitoring – sensors and i	nspection to achieve good MTBF in the fie	Id
Gener	rai construction requirement	hts are covered in NRTL listing (such as fla	immability requirements)
Deliek	liter in different theory "down		he using the graduation
intend	led and looking at its life:	age of abuse in the new – reliability would	be using the product as
intend	ed and looking at its life,		

State Specific Requirements for DC Charging

State of California

As these are being mandated by the state, the working group did not spend much time in discussion of these; compliance will be mandated by state

#	Qualification	Description	Vetting Method
	Public EVSE		
	Equipment with a		
	Network		

#	Qualification	Description	Vetting Method
8-1	Labeling	California Code of Regulations Chapter	Vendor written certification of
		8.3, paragraph 2360.1 ⁴⁴ ; labeling	compliance
		requirements; required by January 1, 2022	
8-2	Fee Disclosure	California Code of Regulations Chapter	Vendor written certification of
		8.3, paragraph 2360.1; fee disclosure	compliance
		requirements; required by January 1, 2022	
8-3	I oll Free Number	California Code of Regulations Chapter	Vendor written certification of
		8.3, paragraph 2360.2; toll free number	compliance
		requirements; A DCFC EVSE installed on	
0 /	Subscription	Colifernia Code of Regulations Chapter	Vandar writtan partification of
0-4	Subscription	8.3 paragraph 2360.2; mombarship or	
		subscription not required to use charging	compliance
		equipment: A DCEC EVSE installed on or	
		after January 1, 2022, shall comply	
8-5	Credit Card Reader	California Code of Regulations Chapter	
	orour our rioudor	8.3. paragraph 2360.2: credit card reader	
		requirements; A DC EVSE installed on or	
		after January 1, 2022, shall comply	
8-6	Roaming	California Code of Regulations Chapter	Vendor written certification of
	Agreements	8.3, paragraph 2360.3; EVSP	compliance
		requirements for roaming agreements;	
		Required by no later than July 1, 2021	
8-7	Reporting	California Code of Regulations Chapter	Vendor written certification of
	Requirements	8.3, paragraph 2360.4; extensive list of	compliance
		Information that must be provided to the	
		State of California, Applies to all EVSPS	
		more publicly available DCEC EVSE	
		installed in California Complex set of	
		reporting deadlines	
8-8	NIST Handbook 44	California Department of Food and	Vendor written certification of
	Compliance	Agriculture, Division of Measurement	compliance
	•	Standards ⁴⁵ - Electric Vehicle Fueling	
		Systems Specifications in the CCR Title 4,	
		§§ 4001 and 4002.11.; requires	
		compliance with NIST Handbook 44	
		sections pertaining to sale of electricity as	
		a fuel (as amended by the State of	
		California); include metering accuracy	
0.0		requirements and timeline for compliance	
8-9	California Energy	California Energy Commission proposed	vendor provided
	20 EVSE Data	Dockot number 18 OIP 01: percerent	documentation
	20 EVSE Dala Requirements	1386	
	Requiremento	See section 7 for the proposed	
		Commission language.	

⁴⁴ California Air Resources Board, <u>https://ww2.arb.ca.gov/sites/default/files/2020-06/evse_fro_ac.pdf</u>

⁴⁵ <u>https://www.cdfa.ca.gov/dms/regulations.html</u>

5 FULL MEETING NOTES

This section includes the full notes as taken from the public working group calls.

AC Charging Electric Vehicle Supply Equipment (EVSE) Qualification Checklist

Updated July 16, 2020

#	Qualification	Description	Vetting Method/Notes		
	EVSE ELECTRICAL				
1-1	Safety requirements	Unit must be listed by qualified Nationally Recognized Test Lab (NRTL) to UL 2594 ⁴⁶ ; will include other UL standards as prescribed by the NRTL; other standards likely to be referenced: UL 2231-1, UL 2231-2, UL 2251, UL 1998	Verify NRTL is qualified Verify record of testing with NRTL and compliance; list all UL standards that were applied		
Input	from August 11, 2020				
Certif	icate of Compliance; Autho	prization to Mark – provided by NRTL; this i	is an actual certificate; some		
have	online directories of compl	ant equipment; NRTLs prefer online verific	cation		
Menti auton classi	on of automated connection nated systems; NRTL can fication or recognition mar	n (SAE J3105) – NRTLs don't have a stan out together a test program (might not allow < – a type certification tuned to the product	dard to test against for these w a listing mark, but in question)		
UL us Techr	ually publishes a documer nical Panel; these eventual	it as an Outline of Investigation based on in ly become standards	nput from a Standards		
For N Mexic	For North America – there is a process called CANENA – this is an activity that the US, Canada and Mexico develop "tri-national"				
Septe Jorda a spe qualifi equip	September 29, 2020 Jordan – how to deal with improper listing; vendor used a lab that is not qualified by OSHA to certify to a specific UL standard; use of an "unqualified NRTL"; how to deal with an NRTL that is no longer qualified (or had qualification removed due to poor practice) – would we then "delist" a piece of equipment?				
Gary	– would require periodic ch	necking of NRTL status; on OSHA			
Rich - has b OSH/	 from NRTL perspective; (een slow to respond so so A list; OSHA not the only el 	DSHA has a program – note that ANSI also me vendors use ANSI as a back up; examp ntity that certifies NRTLs	o certifies test labs; OSHA ple – UL 2251 is not in the		
Gary	– the NEC leaves it the au	thority having jurisdiction to access if the lis	sting of product is adequate		
Rich - off on	 noted that field listing of e this type of field listing; the 	equipment would not show up on website; o ey may or may not accept some NRTLs du	comes down to AHJ to sign e to past experience		

⁴⁶ <u>https://standardscatalog.ul.com/standards/en/standard_2594_2</u>

Gary – be careful that this process isn't too restrictive and eliminate valid equipment due to a limitation in this area (such as NRTL certified by ANSI)

Jordan – would like to have best flexibility; group might chose to exclude an NRTL

Gary – you as a utility would have the option to exclude an NRTL on your own

Rich – NEC uses "labeled or listed" this is to allow for field listing

1-2	Connector and charging interface standard	EVSE charging interface must be compliant with SAE J1772 ⁴⁷	There is no formal compliance regime at this time; Review vendor provided method of vetting to J1772 requirements; This represents a critical item that has very shaky backing (most vendors test their hardware against a broad set of vehicles and assume they are good if the unit works across those vehicles)

Input from August 11, 2020

J1772 is standard – it is interpreted by engineers in different ways – each vehicle doesn't behave the same; this poses a challenge – proceed with caution trying to define compliance; CharIn – trying to develop a test "plug" for J1772

J2953 – has some language for compliance (and interoperability); has section on charging rate (/4); /3 has been idle for a while (test tools focus in /3); overall J2953 has been inactive for a while

Comemso – had a tool, but difficult to use; Argonne National Lab has done work in this area

Keysight – has test tools (golden test device approach)

Jeff S – will provide feedback on Charln activity (is it including AC interface?)

Charln has an implementation guide (15118 focused)

Test events are on hold due to COVID-19

September 29, 2020 Anyone on call know of test tool development? Advait – difficult given the number of auto OEMs

Oleg – what type of test tool are we talking about? Keysight makes tools that do this

Foued – there are test tools, but they don't address variability of vehicles, so doesn't fully answer the issue of interoperability

Oleg – his company offers a test tool for 15118 to monitor communications to help with testing

⁴⁷ https://www.sae.org/standards/content/j1772_201710/

Jordan – interoperability is tough as you need the "whole" system; vehicle side is just as important as EVSE – becomes a system by system assessment; hard, costly, time consuming; through this group – intention is to leverage an ongoing assessment process – continual process where the group provides information about what's happening in the field; example – issue with brand A car and brand B EVSE – group reviews (non-conformance process); only so much you can do in the lab

Jeff – test events can help address this (multiple auto OEMs and EVSE makers)

Mauro - potential for a "golden test tool"

Oleg – standards are great – many situations can be easily done through standards (like a mechanical tolerance); when you have a complex system with communications, this becomes much more difficult; the "plugfest" events are very valuable and are great ways to advance the technology

Mauro - past experience in wi-fi area; takes time and effort; maybe approach in pieces/segments

Jordan – this is a very valid point here – there will be time when vehicle side of system is not compliant (maybe even a safety risk) – this is a possibility; this should be within our scope here; use this group to address issues found in field

Eloi – Nissan has a new vehicle coming out; formerly with CHAdeMO they had a rigorous testing protocol in place to "certify" the CHAdeMO implementation; that is lacking for CCS

Jeff – could we get a measurement company (example – Keysight) could generate a "profile" for each vehicle type – that could be used to test EVSE without need to transport vehicles to a site

Oleg – challenges sometimes arise from causes that would be very difficult to "simulate" with a test tool; gave example of real world test that wouldn't be resolved with a test tool; if you pose a golden test device – whatever problem it has, they will be instilled in all products; still thinks we need plugfest events

Glenn – Chroma gave a demo for their testing of EVSE (car simulator and EVSE simulator) – could look at what they've put together

Oleg – if you look at CharIN plugfest – maybe manufacturer could supply a report of what testing they've participated in

Jordan – like this idea; what vehicle systems would they guarantee that their hardware would work with; Question – what does it take to get "approval"?; for this group – one of the key things different here – active management system and we need to get this going quickly as it is needed ASAP; we need to get things moving – the theory is that EVSE could provide control capability or a vendor says they are compliant with 30 types of cars, but in the field that proves not to be the case, this group could review and give feedback to vendor on issues

Ted – 3rd party certification/confirmation (testing festivals have been "closed" and private); good to have a third party to vet compliance with testing; mentioned EnergyStar and 3rd party data verification; more than what J2953 addresses;

Oleg – we can extend the thought process – maybe talk to CharlN; option – report out positive results and key fails private – reasonable to develop a framework to report public testing

Foued – products used at Testivals may not be final products, so has concern about negative outcomes from testing events; an entity like CharlN could qualify some labs to do a certification to a agreed test plan

Oleg – glad you mentioned OCPP – interoperability testing/certification; don't want another opportunity for labs to make money from industry; example – OCA's OCPP test tool – success doesn't guarantee field performance or interoperability

Foued – semantics and interpretation can be the issue with test tools (especially related to communications protocols)

Oleg – something that at least documents testing that you've done would be good

Mention of OCA test tool having issues with bugs; could we help with that here? These things take time to iron out.

Foued – develops tool and provides – problematic; need a test plan or procedure or a conformance test, but not issued by same agency that promotes or certifies labs

Oleg – believes tools will develop but it will take some time

John – for near term, could we have vendors describe their due diligence to comply with J1772?

Comment - who certifies the testing tools?

Ted – example of test tool developed from a project; DC as a Service project – has tried to develop test hardware; Argonne National Lab has groups of AC chargers that they use to test

Jordan – may take more time, but we might need to add a test profile or a set of characteristics; list things that are beyond J1772; example – issue of pushing button on connector – should this interrupt the charge? In lab, they saw inconsistent behavior of this; maybe this is beyond J1772; not sure if J1772 should cover this; had a vehicle that didn't interrupt charging on push of latch switch

Foued – feel that when there is a problem – the EVSE is always blamed

Gary – J1772 was a "recommended practice" (John comment – now a standard); there are still elements not fully defined that challenge interoperability

Jordan – if J1772 was optional – this group could decide to make that a requirement (not so concerned about the document label)

Foued – this effort looks to qualify the EVSE and NOT the vehicle; this leaves open that vehicles can behave "badly"; can cause issues, like arcing on pins

Jordan – safety is prime; even though we won't look at vehicles, but we could call out specific issues as a group

Gary – noted that EVSE doesn't look at proximity wire in AC charging (not required), so issue noted that for proper function you must have vehicle work correctly

Eloi – J1772 should cover EV to EVSE, so it should cover issues noted above

Jordan – as a group could define safety standards

Gary – could this group add new safety standards beyond what UL has?

Mauro – we would at least provide feedback

Gary – what is scope of group? Don't know that we should write new safety standards in this group

John – EPRI would not support this group writing standards; we would want to inform existing standards to address gaps

Jordan – maybe we don't write a standard – but we might write a requirement

Some debate related to an example – arcing – is it a safety issue or a functional/damage issue; could propagate to many vehicle

Barbara – agree with Jordan; started this journey – Exelon helped put this effort together; many issues of concern (safety being one); arcing would be considered a safety issue on their part; these things come back to the utility; don't want to enable deployment of equipment that could have issues like this; as soon as there is an issue in the field – it comes back to the utility (if they have enabled fielding of equipment)

Gary – let's make proposals – rule – standard – requirement – that we would write, that would be applied to a charging station – for example to solve arcing problem – how would we do that?

Barbara – don't have answer – but we still need to take action

Gary – key point – how do we solve these issues in the context of the standards that we already have? Itemize issues/gaps and carry those back to standards

Mauro - field issues would need to be documented and addressed by this group

On arcing issue – if vehicle misbehaves, there is nothing that the EVSE can do to prevent this

Need to avoid assigning blame on EVSE makers and involve vehicle OEMs in the mix

Another example – some vehicles did not respond as expected when J1772 pilot was used to implement demand response curtailment of charging; vehicle did not behave as expected; Not an issue with J1772 – but was issue in vehicle

See this group helping to provide this feedback to address issues found in the field

We could record asks for the vehicle side as well; identify issues and right down proposals

Eloi – challenge that automakers have to deal with many EVSE; this can be a challenge

Jordan – don't agree that we have to only use someone else's standard – we can write a requirement that isn't in another standard; we agree here – we don't want to add more than is needed; do want to rely on existing/external standards as much as possible

Gary – we could ask for vendor documentation to address requirement (yes, I comply and here's what I did to comply)

Jordan – we want the added coverage of ongoing review of field performance to vet compliance claim

Gary – can address issue by asking for specific items to be required in warranty

Jordan – concern with warranty path with long delays in addressing issues

1-3 Pc	ower quality criteria	EVSE must be compliant with applicable portions of SAE J2894/1 ⁴⁸ based on testing as described in SAE J2894/2 ⁴⁹	Vendor provided documentation; limited applicability for AC charging since AC-DC conversion power electronics are onboard the vehicle; may require that we list specific tests to be performed from J2894/2		
Input from Cold start active in u in flux	n August 11, 2020 t (cold load pick-up) – c updating some of the p	one of the parameters that would be import arameters – so not sure how you can vet c	ant in this work; J2894 is compliance while things are		
This will li	ikely matter more for D	C fast charging hardware			
EMC is ex area); J28 standards that relev	xtensively covered by l 394 come from EPRI In and Power Quality wa ant now	JL requirements (makes J2894 almost irre frastructure Working Council in 1990s (at is a big utility concern (based on computer	levant at least in the EMC that time there were no [.] power supply issues) – not		
NRTL cer by UL 259	tification to UL 2954 lik 94)	ely covers what J2894 provides (through l	JL 2231-2 which is required		
Good exe	ercise – what is in J289	4 that might not be covered by UL complia	ince?		
Cold load pick-up – not without controversy; original EPRI work had a ten minute delay with randomized period following; when J2894 first developed, 10 minute delay was kept, but random timing start was eliminated; discussion of late in J2894 relates to how much concern utilities will have for EV load during a cold load pick-up event					
Ramp rate (amps per second) is important (but this would not be controlled by the EVSE for AC charging)					
All charge for an AC	All chargers have a ramp rate – but can't be set too aggressively (high A/s rate) – again – not an issue for an AC EVSE; the EVSE can't do this through the pilot signal				
David Val EMC requ compone	nderlin provided this in uirements for EVSE's a nt for a UL 2594 produ	out via email: re not in UL 2594, they are actually in UL 2 ct.	2231-2 which is a required		
The tests know.	from UL 2231-2 Table	of Contents are. If you want a synopsis of	f the limits and levels, let me		
24 Resist .48 24.1 Gen 24.2 Harr 24.3 Elec 24.4 Radi	ance to Environmental eral	Noise Test			

 ⁴⁸ <u>https://www.sae.org/standards/content/j2894/1_201901/</u>
 ⁴⁹ <u>https://www.sae.org/standards/content/j2894/2_201503/</u>

-				
24.5 I 24.6 E	mmunity to conducted dist Electrical fast transient imn	urbances, induced by RF fields		
24.7 \	/oltage dips, short interrup	tions and voltage variations immunity		
24.8 N	Magnetic field immunity			
24.90	Capacitor switching transie	nt test		
24.10	Voltage surge test			
Septe	mber 29, 2020			
Gary	 UL has expanded coveration 	age of UL 2231-2 to include performance/r	eliability issues for abnormal	
grid c	onditions			
Jorda focus	n – J2894 may have simila ed on this	arities – objective of J2894 is utility interact	ion; UL standards are not	
1 4	DE	Compliance with Eddered	Verify listing on ECC	
1-4	KF	Compliance with Federal	verily listing on FCC	
	requirements	Part 15: Code of Ecdoral Populations		
	requirements	Title $A7$ Part 15^{50} (A7 CER 15)	currently use website to	
			identify equipment)	
Input	from August 11, 2020			
Regul	latory requirement for all p	roducts – in US – we follow ECC quideline	s (somewhat harmonized	
with F	Furope): product must abso	blutely do this – but there is no verification	or certification that you have	
comp	lied heavy fines for non-co	ompliance: this is a self-certification done h	by the manufacturer (in-	
house	e or can use an outside lab) – generate an FCC report: vendor retains	s a permanent copy of this	
docur	nent	, generale and e e epond, conserved and		
To vet this criteria – we could ask vendors to provide a copy of their FCC test report				
NRTL in the	s evaluating to a UL stand UL standard); NRTLs can	ard would not request or require this (unle perform the FCC testing	ss it was specifically required	
Septe	ember 29, 2020			
Gary	- would not want to releas	e their test report; what could we ask for to	show compliance? Test	
report	t would be proprietary; deta	alls of report would be proprietary		
John -	– we just want the cover le	tter to prove you've done testing		
Foued	d – we should trust EVSE v	vendor and FCC website		
Gary equip	– agree with this; key woul ment without having done	d be how do you weed out total fraud (thos testing)	se that would mark	
4 5				
1-5	Electrical - Installation	Compliant with requirements of	vendor provided	
		National Electric Code; National Fire	documentation	
		Protection Association (NFPA) 70		
Input	Trom August 11, 2020			
Some	INKILS CONTIRM COMPlianC	ce with NEC, but not part of standard		

⁵⁰ <u>https://www.govinfo.gov/app/details/CFR-2010-title47-vol1/CFR-2010-title47-vol1-part15</u>

⁵¹ <u>https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=70</u>

UL 2594 – is designed to make sure a product meets the requirements of the NEC

We may be able to leave this element out as it is covered by NRTL testing

September 29, 2020

Jordan – this is a tricky area; not sure he wants to eliminate this; issue of states being on different version of NEC

Gary – thinks it would be safe to say that a product listed to the UL standard would be NEC compliant; the state level issue of varying code requirements (using different years of NEC) is still a potential issue

Jordan - NEC still has ventilation requirements; how does this align with UL 2594?

Gary – not aware of any EVSE that offers ventilation in commercial product space; pilot wire voltage would ensure that a vehicle that requires ventilation would not charge; UL requires station to be marked related to ventilation capability

1-6	Energy Efficiency	Environmental Protection Association	Verify listed on EPA
		(EPA) EnergyStar for EVSE ⁵² ; EPA	EnergyStar website
		program related to energy efficiency of	
		end use products; reference current	
		EnergyStar EVSE document	

Input from August 11, 2020

There are about 35 EVSE models from about 14 manufacturers on the Energy Star Website

Note that Energy Star requires NRTL listing

	<u> </u>		
#	Qualification	Description	Vetting Method/Notes
	EVSE PHYSICAL		
2-1	Enclosure suitable for	Enclosure rating; National Electrical	Vendor provided
	application	Manufacturers Association (NEMA) ⁵³ or	documentation; ANSI/IEC
		Ingress Protection (IP)	60529
		 c. Indoor – any NEMA rating 	
		d. Outdoor – 3R (IP14), 4 (IP56),	
		4X (IP56)	
		Compliance with NEMA or IP standards	
		as noted	

Input from August 11, 2020

This just seems to be common sense – equipment should be designed for the application

UL 2594 requirement – device is properly rated for the application; required to be on nameplate

September 29, 2020 This is more along the lines of a "feature"

Noted that 3R and IP14 are not exact equivalent

For outdoor - specify "product is listed for outdoor use"

Jason Anderson of Eaton provided the following input via email, November 25, 2020:

2-1	Enclosure suitable for	Compliance with	Wording should be amended to a minimum
	application	NEMA or IP	standard (i.e. 3R minimum) unless the
		standards as noted	installation calls for a stricter one.

⁵² <u>https://www.energystar.gov/products/other/evse</u>

⁵³ https://www.nema.org/Products/Documents/nema-enclosure-types.pdf

	Enclosure rating; National Electrical Manufacturers Association (NEMA)17 or Ingress Protection (IP) c. Indoor – any NEMA rati d. Outdoor – 3R (IP14), 4 (4X (IP56)	ng (IP56),	Vendor provided documentation; ANSI/IEC 60529		
2-2	Minimum Operating Temperature Range	Equipr operat deg F deg C)	nent must be capab ion over the tempera to XXX deg F (-30 d	le of normal ature of xx eg C to 40	Is there an accepted industry range? Could say "compliant with UL 2594"
Input No in	from August 11, 2020 Justry de facto range				
One p used	product -30 deg C to 50 deg industry	g C (tes	ted as part of NRTL	process); belie	eve this is a consistent range
There appea	There are products that are outside of this range; temperature rating is an NRTL requirements and appears on the device markings			NRTL requirements and	
The v	The value will be part of UL 2594 listing – maybe we just document range for a given product				
Septe UL 25	mber 29, 2020 94 range is -30 deg C to 4	0 deg C	: (minimum range)		
Gary	- would prefer not to list th	is if it is	already covered		
John 2594" minim	– issue – users don't know ; maybe a few sentences t uum;	what th hat deso	ey are getting when cribe at a high level	the use a piec what the safety	e of equipment "listed to UL v standards get you at a
This v	vould have to be updated a	at standa	ards evolve		
2-3	Physical Security	If enclo tool – I	osure can be opene now is it secured?	d without a	No standard to reference
Input	from August 11, 2020				
UL 25 requir	94 – has accessibility of liv ements are also covered ii	ve parts n UL 259	requirements that w 94	vould be met in	listing; mounting means
IEC a	nd UL have a finger test (li	ve parts	access)	arity of	
2-4	Cybersecunty	firmwa	re and operation of	EVSE	
Input No sta but no	from August 11, 2020 andards – there are some ot fully developed at this	guidelin	es and Department	of Energy funde	ed projects looking at this –
2-5	Durability	Paint,	materials, displays		No standard to reference
UL 25	94 does have labeling dur ed markings	ability re	equirements (markin	gs); do not cov	er paint or display but
UL 25	94 does have paint/materi	als/cons	struction analysis (fo	cuses on enclo	osure)

This would get into being a fabrication standard (such as how you apply paint) ASTM may have paint durability ratings					
ASTM may have paint durability ratings					
Is this about appearance or functional durability?					
2-6 Minimum Display Power indicator: graphic display? No standard to reference					
Requirements					
Input from August 11, 2020					
UL 2594 has a fault condition display requirement (ground fault or grounding monitor fault)					
This falls more in line with a customer feature requirement – probably best not to include on this list					
Should we consider – is the "station available"? That would not be covered by UL doc and no existing requirement					
We'll classify this as a feature					
2-7 American With Must be capable of being installed in Vendor documentation;					
Disabilities Act (ADA) compliance with ADA requirements note that ADA is mostly an					
equipment must provide					
features to support ADA:					
no standard to reference					
Input from August 11, 2020					
This is based on a height requirement for controls/displays/cable access: ADA has force requirements					
aren't in line with EV connector actual behavior (plug and un-plug force)					
Lack of a pedestal option might impact ability to be ADA compliant but still very installation dependent					
Vendor self-statement that their hardware CAN be installed in compliance					
No third-party certification of ADA compliance at hardware level					
# Qualification Description Vetting Method/Notes					
EVSE PAYMENT and This focuses on requirements for local					
AUTHENTICATION hardware					
SYSIEMS					
3-1 Devices Do we need to list specific interfaces Reference device					
(such as touchless credit card payment standards?					
hardware)?					
Input from August 11, 2020 This feels more like a feature and not something that can be set in a requirement					
Jason Anderson of Eaton provided the following input via email, November 25, 2020:					
3-1 EVSE PAYMENT and Wording should be amended to be optional					
_ AUTHENTICATION depending on the solution.					
3-4 SYSTEMS					
3-2 Protocol If payments system uses an Should this be combined					
independent network what protocol with network					
does it use?					
Input from August 11, 2020					
This is likely to be vendor dependent					

3-3	Security	Local har	dware security	requirements	Is PCI compliance
		for payme	ent system		applicable at the hardware
	frame Assessed 4.4, 0000	l			level?
	from August 11, 2020	wel would a	over this (assu	iming that having	ont is made at charging
station	n): not all systems collect r	pavment at	charging syste	m	ant is made at charging
olation	i, not an ofotomo concerp	aymont at	enarging eyete		
This n	nay fall more along the line	es of a featu	ure		
3-4	Minimum payment				Vendor documentation
	options	l			
Gener	from August 11, 2020 ral comment – state level r	aquiraman	s are they a	propriate for this	list? Will this become an
undue	burden to keep up with a	nd maybe s	s – ale illey al should not be ir	ncluded	
	· · · · · · · · · · · · · · · · · · ·				
Or we	can only reference state r	equiremen	ts and not try to	o vet those in this	document
#	Qualification	Descriptio	on		Vetting Method/Notes
4.4	NETWORKING	Detailed	le e suistie se effet		
4-1	EVSE Data Available –	Detailed of	escription of a	ata that is	No standard to reference;
	Tomat	and forma	of reporting of	of the data	data format
					Pie
					INL Requirements for 3rd party EVSE d
					Suggestion that we use
					OCPI for real time data
Input	from August 11, 2020				
Jonn I	H – CONTACTED IDANO NATIO	nal Lab and	i was given a r	OF EV Project	lid be considered a public
uocun		requireme			
Might	need to distinguish collect	ing the data	a and reporting	the data	
-	-	-			
Some	elements of data are part	of NIST re	porting require	ments	
Goali	s to see if there is an indu	strv de fact	n set of data be	eina reported in h	ones of avoiding custom
data r	equirements in every depl	ovment		cing reported in h	opes of avoiding custom
	- 4	- ,			
Likely	that there will be unique c	ustomer ne	eds in the data	a space	
			4 0000		N
Startir	vas the last item covered on the last item cov	n August 1 0 working (1, 2020 meeting	ig (ran out of time	;)
Startii	ig here for August 20, 202		group meeting		
There	is no standard for this dat	a content			
Could	this be provided by Open.	ADR?			
Is the	re a wav to standardize an	API based	approach?		
-					
The Ir	NL data format is not unive	rsally used	and vendors r	ave been require	ed to provide other data.
Jason	Anderson of Eaton provid	led the follo	wing input via	email, November	25, 2020:
4-1	NETWORKING			Wording should b	be amended to be optional
-				depending on the	solution.
4-					
14					

4-2	EVSE Data – communication (at the network level)	How is data communicated in reference to item 4-1	No standard to reference		
Input Gener	from August 26,2020 rally done via web portal; g	proup did not know of a standard form to pr	ovide data		
Real t	ime view versus download	ing files record – this is focused on the larg	ge file downloads		
Does	Orange Button or Green B	utton standards deal with this type of data?	?		
Also - (inclue	- approach of getting data des metadata that a statior	from an individual device – not likely to be n may not have or know)	available at this level		
Need	to define data – what data	? See item 4-1			
Would	NOT include getting data	directly from a single EVSE or at a site.			
NIST covere	process – inspectors may ed here; covered by other	need to look at and obtain data from individ regulations (at state level)	dual stations; that is not		
Consu	umer – there may be data	provided to the consumer (that is not cover	ed here)		
4-1 is	not standardized – that like	ely needs to happen first before you addre	ss how data is provided.		
See 4	-1 about API method as po	ossibility.			
4-3	Location Map with Realtime Data – Utility Focused	Host or system operator tools for charging site management	No standard to reference		
Input	from August 26, 2020				
Maps	in general are driver focus	ed; static data is on the AFDC website (DC	DE)		
Realti	me data is consumer focus	sed – what would be different for utility? Se	ee next item.		
4-4	Location Map with Realtime Data – Consumer Focused	Consumer facing map tools	No standard to reference		
4-5	Phone Support Services	Phone support services requirements	No standard to reference		
Input	Input from August 25, 2020				
On list due to California's requirements Minimum requirement for availability? 24/7 for drivers for support? Tech support maybe only during specific business hours					
This n	nay be application specific	– may not always be needed (say, for a be	ehind the fence unit)		
Custo	mer call in number is only	for publicly available charging stations			

4-6	Cloud Based API Features for Utility	API features and functions	No standard to reference			
	Interaction - Data					
Input See d comm	Input from August 25, 2020 See discussion from 4-1 and 4-2; could reference API capability without need for specifics about communications specifics; does need to include security					
How of here there	do utilities connect to field o o use with EVSE? Germa	devices now (such as thermostats) – is tha ny has established EEBus as means of co	t anything we could pull from nnectivity – potential option			
4-7	Cloud Based API Features for Utility	API demand response requirements	No standard to reference OpenADR2.0b?			
	Response		This would be for utility demand response programs			
Input There	from August 25, 2020 are some emerging stand	ards but many utilities still "do their own th	ing"			
Califo	rnia has looked at OpenAI	DR as an option				
Scope	e of demand response is b	road – OpenADR may be limiting				
IEEE	1547 identified three different	ent protocols – so the option could be to na	ame multiple protocols			
Indust	try approaches still vary gr	eatly				
4-8	Cloud Based API Features for Utility Interaction – User Event Notification	API notification requirements	No standard to reference			
Input	from August 25, 2020		I			
See o	ther API related items					
The b	iggest challenge <mark>for API</mark> ba	ased connectivity – manufacturers don't kn	ow what they should do			
Value would	may be in listing current a be defined	pproaches and scenarios and use that to c	define communications			
Could we just define what the things are? Is there a common list of data pieces that utilities want and in what format? Get this list first, then worry about to transport the data.						
Anoth	Another approach is IEEE 1547 model – do we want all EVSEs need the same features/capabilities?					
l don'i comm	I don't think we are in a mature enough situation to know what features and data might be needed and communicated at this point.					
Some	of these elements are def	ined in protocols (like OCPP and OpenAD	R) – but are different			
IEEE	2030.5 and DNP3 are both	n working on EVSE comms (as is ISO 151	18)			
We co	ould reach out to Charln ar	nd Open Charge Alliance for their input on	this topic.			

4-9	EVSE to Network Communications - Protocol	Protocol used to manage EVSE from by a charging network	Example: Open Charge Point Protocol Version 1.6? Open Charge Alliance – certified via OCA compliance tool?	
Input	from August 25, 2020			
OCPF issue	P is prevalent – but the pro but what portions/parts of	blem comes in at implementation; not nece the OCPP profiles are implemented.	essarily interoperability is at	
Focus flexibl	here is on trying to preven e (and expect change)	nt stranded assets; OCPP 1.6 might be goo	od for today – but need to be	
The g (SDO	oal would be to have some s)	ething we can reference from a standards o	development organization	
Exam – we o	ple – "must only use OCPI don't want that	P core profile" – would that lock out other fe	eatures or prevent innovation	
This n disting	night be use case depende guish residential from com	ent – commercial versus residential installa mercial;	tions – do we need to	
May a	llso want to separate AC a	nd DC charging here		
Could	refer to "Open Network P	rotocol" to be flexible		
If we of with e	do reference OCPP – we r xtensions used by vendors	eed to be clear what part of the profile is re (DataTransfer messages)	eferenced; how do we deal	
4-10	EVSE to Network Communications – Security - Communications	Network security requirements	No standard to reference NIST 800-53?	
Input	from August 25, 2020			
PCI c	ompliance is often reference	ced		
SOC2	compliance is also gainin	a some traction		
4-11	EVSE to Network Communications – Security - Data	Specific data security requirements	No standard to reference	
Input Secur	from August 26, 2020 ity requirements are likely	to vary as to security requirements based o	on the data content	
Experience that some users are now asking for compliance to the security requirements that OCA has defined for OCPP 1.6 (there is an OCA white paper on the topic)				
4-12	EVSE to Network Communications – Security – Physical	System physical security requirements	No standard to reference	
Input	from August 26, 2020			
This n	nay belong in the physical	requirements list and not in networking		
Vendo will ha	or mentioned that some cu ave to rely on physical sect	stomers are requesting data paths that are urity	by definition unsecure and	

These	These might be redundant requirements for a secure facility (where this is covered by the physical installation)				
4-13	EVSE to Network Communications – Remote Firmware Maintenance	Remote firmware updating capability and related requirements	No standard to reference How is this handled when EVSE maker and Network operator are not the same company?		
4-14	Roaming	Requirements for roaming	Covered by state specific language for California		
			OCPI – primary use is roaming; NREL/AFDC starting to use this for data on locations, by Plugshare (Recargo) for real time station status – may be a good standard to align around for roaming		
Input Is OC	from August 26, 2020 PI adequate and well acce	pted?			
Most	major networks are building	g this interconnectivity			
Need	to make clear this is for Pu	ublic Charging			
Makin happe	ng this a requirement – can en	be tricky in that it takes more than jus	t a single vendor to make this		
While many use OCPI – is it the best method or better to leave more open ended and focus on end result that consumers can roam					
While result	many use OCPI – is it the that consumers can roam	best method or better to leave more o	open ended and focus on end		
While result #	many use OCPI – is it the that consumers can roam Qualification	best method or better to leave more of Description	open ended and focus on end Vetting Method/Notes		
While result #	many use OCPI – is it the that consumers can roam Qualification Customer Experience	best method or better to leave more of Description These are operation related requirements – not sure they belong this list	open ended and focus on end Vetting Method/Notes in		
While result # 5-1	many use OCPI – is it the that consumers can roam Qualification Customer Experience Customer Experience – Usability - Diagnostics	best method or better to leave more of Description These are operation related requirements – not sure they belong this list Required diagnostic	Vetting Method/Notes in No standard to reference Is this local or network based – should this be moved under network?		
While result 5-1 Jasor 5-1 - 5-3	many use OCPI – is it the that consumers can roam Qualification Customer Experience Usability - Diagnostics	best method or better to leave more of Description These are operation related requirements – not sure they belong this list Required diagnostic ed the following input via email, Nover Wording show depending on	Vetting Method/Notes in No standard to reference Is this local or network based – should this be moved under network? mber 25, 2020: Ild be amended to be optional the solution.		
While result 5-1 Jason 5-1 - 5-3 5-2	many use OCPI – is it the that consumers can roam Qualification Customer Experience Usability - Diagnostics Anderson of Eaton provid Customer Experience Customer Experience	Description These are operation related requirements – not sure they belong this list Required diagnostic ed the following input via email, Nover Wording show depending on Uptime requirements	Vetting Method/Notes in No standard to reference Is this local or network based – should this be moved under network? mber 25, 2020: ald be amended to be optional the solution. No standard to reference How defined?		
While result # 5-1 Jasor 5-1 - 5-3 5-2 Input	many use OCPI – is it the that consumers can roam Qualification Customer Experience Customer Experience – Usability - Diagnostics Anderson of Eaton provid Customer Experience Customer Experience Customer Experience Customer Experience Customer Experience Customer Experience Customer Experience – Usability – Uptime from August 26, 2020	best method or better to leave more of Description These are operation related requirements – not sure they belong this list Required diagnostic ed the following input via email, Nover Wording shoud depending on Uptime requirements	Vetting Method/Notes in Vetting Method/Notes in No standard to reference Is this local or network based – should this be moved under network? mber 25, 2020: Ild be amended to be optional the solution. No standard to reference How defined?		
While result # 5-1 Jason 5-1 - 5-3 5-2 Input Seein netwo	many use OCPI – is it the that consumers can roam Qualification Customer Experience Customer Experience – Usability - Diagnostics Anderson of Eaton provid Customer Experience Customer Experience Customer Experience Customer Experience Customer Experience Customer Experience – Usability – Uptime from August 26, 2020 g uptime requirements in some other parts of network	best method or better to leave more of Description These are operation related requirements – not sure they belong this list Required diagnostic ed the following input via email, Nover Wording shoud depending on Uptime requirements solicitations but generally vague as to value k uptime is reported	Verting Method/Notes in No standard to reference Is this local or network based – should this be moved under network? mber 25, 2020: Ild be amended to be optional the solution. No standard to reference How defined? what it means; often uses cell		

Could address this with a requirement for memory (or buffering) to support network connectivity gaps (outages)

There is also a tie with maintenance and upkeep – being proactive to help address this

5-3	Customer Experience –	Repair response time to repair	No standard to reference
	Usability – Repair		Would need detailed
	Response		definition. Could be
			hardware related or
			network related or both.

#	Qualification	Description	Vetting Method/Notes
	In-Field Feedback from		
	Performance		
6-1	TBD		
#	Qualification	Description	Vetting Method/Notes
	Reliability		
7-1	MTBF	Some form of equipment reliability specification?	Would this be for hardware only or hardware and network?

Input from August 26, 2020

This may be more tied to service contracts and terms of that contract than upfront requirement

Preventative maintenance and field inspection or automate inspection

System complexity will vary greatly (single AC EVSE versus a multi-charger DC installation with interconnected charging buses and cooling systems)

Even if you specified MTBF – it isn't likely to result in better field performance – there you need monitoring – sensors and inspection to achieve good MTBF in the field

One response to this would be to define sensors or automated monitoring; not desirable if this would impact existing equipment in the field – need to be very careful if you went down this path

This should focus on "used and useful" - a normal utility requirement

General construction requirements are covered in NRTL listing (such as flammability requirements)

Reliability is different than "damage" or abuse in the field – reliability would be using the product as intended and looking at its life;

Jason Anderson of Eaton provided the following input via email, November 25, 2020:

7-1	Reliability/MTBF	Wording should be amended to allow for a
		defined warranty period by the product
		manufacturer to cover this qualification.

State Specific Requirements for AC Charging State of California

#	Qualification	Description	Vetting Method
	Public EVSE Equipment with a Network	Some requirements are not yet required – should they be included?	

8-	Labeling	California Code of Regulations Chapter 8.3,	Vendor provided
1		paragraph 2360.1 ⁵⁴ , ⁵⁵ ; labeling	documentation
	Ess Disals sums	requirements; required by July 1, 2023	Man dan musiklad
8- 2	Fee Disclosure	California Code of Regulations Chapter 8.3,	vendor provided
2		requirements: required by July 1, 2023	documentation
8	Toll Free Number	California Code of Regulations Chapter 8.3	Vendor provided
3	TOILLIEE MULTIDE	paragraph 2360 2: toll free number	documentation
0		requirements: AC EVSE installed on or	documentation
		after July 1, 2023, shall comply	
8-	Subscription	California Code of Regulations Chapter 8.3,	Vendor provided
4		paragraph 2360.2; membership or	documentation
		subscription not required to use charging	
		equipment; An AC EVSE installed on or	
		after July 1, 2023, shall comply	
8-	Credit Card Reader	California Code of Regulations Chapter 8.3,	
5		paragraph 2360.2; credit card reader	
		requirements; An AC EVSE installed on or	
		after July 1, 2023, shall comply	
8-	Roaming	California Code of Regulations Chapter 8.3,	Vendor provided
0	Agreements	paragraph 2360.3; EVSP requirements for	documentation
		then July 1, 2021	
8-	Reporting	California Code of Regulations Chapter 8.3	Vendor provided
7	Requirements	paragraph 2360 4 ⁻ extensive list of	documentation
	rioquironito	information that must be provided to the	
		State of California; Applies to all EVSPs	
		operating or intending to operate one or	
		more publicly available Level 2 EVSE	
		installed in California; Complex set of	
		reporting deadlines	
8-	NIST Handbook 44	California Department of Food and	Vendor provided
8	Compliance	Agriculture, Division of Measurement	documentation
		Standards ³⁰ - Electric Vehicle Fueling	
		Systems Specifications in the CCR Title 4,	
		ss 4001 and 4002.11., requires compliance	
		to sale of electricity as a fuel (as amended	
		by the State of California): include metering	
		accuracy requirements and timeline for	
		compliance	
8-	California Energy	California Energy Commission proposed	Vendor provided
9	Commission – Title	data collection requirements; Title 20;	documentation
	20 EVSE Data	Docket number 18-OIR-01; paragraph 1386	
	Requirements		
		Proposed data	
		collection requireme	

⁵⁴ California Air Resources Board, <u>https://ww2.arb.ca.gov/sites/default/files/2020-06/evse_fro_ac.pdf</u>

⁵⁵ <u>https://ww2.arb.ca.gov/our-work/programs/electric-vehicle-supply-equipment-evse-standards</u>

⁵⁶ <u>https://www.cdfa.ca.gov/dms/regulations.html</u>

DC Charging Electric Vehicle Supply Equipment (EVSE) Qualification Checklist

This section includes the full notes as taken from the public working group calls.

Updated	d August 11, 2020		-			
#	Qualification	Description	Vetting Method			
	EVSE ELECTRICAL					
1-1	Safety requirements	Unit must be listed by qualified Nationally Recognized Test Lab (NRTL) to UL 2202 ⁵⁷ ; will include other UL standards as prescribed by the NRTL; other standards likely to be referenced: UL 2231-1, UL 2231-2, UL 2251, UL 1998	Verify NRTL is qualified Verify record of testing with NRTL and compliance; list all UL standards that were applied			
Input f	rom August 11, 2020					
Certific have c	cate of Compliance; Autho Inline directories of complia	rization to Mark – provided by NRTL; this i ant equipment; NRTLs prefer online verific	s an actual certificate; some ation			
Mentic autom classif	on of automated connection ated systems; NRTL can p ication or recognition mark	n (SAE J3105) – NRTLs don't have a stand out together a test program (might not allov – a type certification tuned to the product	dard to test against for these v a listing mark, but in question)			
UL usu Techni	ually publishes a documen ical Panel; these eventuall	t as an Outline of Investigation based on ir y become standards	nput from a Standards			
For No Mexico	orth America – there is a pr o develop "tri-national"	rocess called CANENA – this is an activity	that the US, Canada and			
1-2	Connector and charging interface standard	EVSE charging interface must be compliant with SAE J1772 ⁵⁸ EVSE charging interface must be compliant with CHAdeMO	There is no formal compliance regime at this time; Review vendor provided method of vetting to J1772 requirements; CHAdeMO alliance maintains standard – may have compliance tools			
Input from August 11, 2020 J1772 is standard – it is interpreted by engineers in different ways – each vehicle doesn't behave the same; this poses a challenge – proceed with caution trying to define compliance; CharIn – trying to develop a test "plug" for J1772						
J2953 – has some language for compliance (and interoperability); has section on charging rate (/4); /3 has been idle for a while (test tools focus in /3); overall J2953 has been inactive for a while						
Comer	Comemso – had a tool, but difficult to use; Argonne National Lab has done work in this area					
Keysig	ht – has test tools (golden	test device approach)				
Jeff S	– will provide feedback on	CharIn activity (is it including AC interface	?)			
CharIn	CharIn has an implementation guide (15118 focused)					

⁵⁷ <u>https://standardscatalog.ul.com/standards/en/standard_2202_2</u>

⁵⁸ <u>https://www.sae.org/standards/content/j1772_201710/</u>

Test events are on hold due to COVID-19					
1-3	Power qualify criteria	EVSE must be compliant with applicable portions of SAE J2894	Vendor provided documentation; limited applicability since AC/DC conversion power electronics are onboard the vehicle Suggestion that we add <5% harmonics per IEEE 519 Note that SAE J2894 has a spec for harmonics		
Input fi Cold st	rom August 11, 2020 tart (cold load pick-up) – o	ne of the parameters that would be impor	tant in this work: J2894 is		
active in undating some of the parameters – so not sure how you can yet compliance while things are					

ctive in updating some of the parameters – so not sure how you can vet compliance while things are in flux

This will likely matter more for DC fast charging hardware

EMC is extensively covered by UL requirements (makes J2894 almost irrelevant at least in the EMC area): J2894 come from EPRI Infrastructure Working Council in 1990s (at that time there were no standards and Power Quality was a big utility concern (based on computer power supply issues) - not that relevant now

NRTL certification to UL 2954 likely covers what J2894 provides

Good exercise - what is in J2894 that might not be covered by UL compliance?

Cold load pick-up - not without controversy: original EPRI work had a ten minute delay with randomized period following; when J2894 first developed, 10 minute delay was kept, but random timing start was eliminated; discussion of late in J2894 relates to how much concern utilities will have for EV load during a cold load pick-up event

Ramp rate (amps per second) is important (but this would not be controlled by the EVSE for AC charging)

All chargers have a ramp rate - but can't be set too aggressively (high A/s rate) - again - not an issue for an AC EVSE; the EVSE can't do this through the pilot signal

David Vanderlin provided this input via email:

EMC requirements for EVSE's are not in UL 2594, they are actually in UL 2231-2 which is a required component for a UL 2594 product.

The tests from UL 2231-2 Table of Contents are. If you want a synopsis of the limits and levels, let me know.

24 Resistance to Environmental Noise Test	
24.1 General	
24.2 Harmonic distortion immunity	48A
24.3 Electrostatic discharge immunity	48A
24.4 Radiated electromagnetic field immunity	48A

24.5 In	nmunity to conducted distu	Irbances, induced by RF fields		
24.6 E	24.6 Electrical fast transient immunity			
24.7 V	24.7 Voltage dips, short interruptions and voltage variations immunity			
24.0 W	agnetic field infinuting	nt test	50	
24.10	Voltage surge test			
	·····g·····g·····			
1-4	RF	Compliance with Federal	Verify listing on FCC	
	emissions/susceptibility	Communications Commission (FCC)	qualification website	
	requirements	Part 15; Code of Federal Regulations,		
Input fi	rom August 11, 2020	Title 47, Part 15 ³⁹ (47 CFR 15)		
Regula	tom August 11, 2020	oducts – in US – we follow ECC quidelines	s (somewhat harmonized	
with Fi	urope): product must abso	lutely do this – but there is no verification of	or certification that you have	
compli	ed; heavy fines for non-co	mpliance; this is a self-certification done by	v the manufacturer (in-	
house	or can use an outside lab)	– generate an FCC report; vendor retains	a permanent copy of this	
docum	ient			
To vet	this criteria – we could asl	κ vendors to provide a copy of their FCC te	est report	
	avaluating to a LIL stands	and would not request or require this (unles		
in the l	s evaluating to a UL standa	and would not request of require this (unles	is it was specifically required	
1-5	Can be safely installed	Compliant with requirements of	Vendor provided	
10	our be ballery motalled	National Electric Code: National Fire	documentation	
		Protection Association (NFPA) 70		
		(NEC) ⁶⁰ ; focus on article 625		
Input fi	Input from August 11, 2020			
Some	Some NRTLs confirm compliance with NEC, but not part of standard			
We ma	ay be able to leave this ele	ment out as it is covered by NRIL testing	Verify listed on EDA	
1-0	Energy Efficiency	(EDA) EnergyStar for EVSE ⁶¹ : EDA	ForgyStar wobsite	
		program related to energy efficiency of	EnergyStar website	
		end use products: reference current		
		EnergyStar EVSE document		
Energy	/ Star for DCFC still a worl	<pre>< in progress</pre>	1	
	EVSE PHYSICAL			
2-1	Enclosure suitable for	Enclosure rating; National Electrical	Vendor provided	
	application	Manufacturers Association (NEMA) ⁶² or	documentation; ANSI/IEC	
		Ingress Protection (IP)	60529	
		e. Indoor – any NEMA rating		
		f. Outdoor $- 3R$ (IP14), 4 (IP56),		
		4X (IP30) Compliance with NEMA or ID		
		standards as noted		
Input fi	rom August 11, 2020			
This ju	This just seems to be common sense – equipment should be designed for the application			
,				

⁵⁹ <u>https://www.govinfo.gov/app/details/CFR-2010-title47-vol1/CFR-2010-title47-vol1-part15</u>

 $^{^{60}\ \}underline{https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=70$

⁶¹ <u>https://www.energystar.gov/products/other/evse</u>

⁶² https://www.nema.org/Products/Documents/nema-enclosure-types.pdf

UL 22	UL 2202 requirement – device is properly rated for the application; required to be on nameplate			
2-2	Minimum Operating	Equipment must be capable of normal	Is there an accepted	
	Temperature Range	operation over the temperature of xx	industry range?	
		deg F to XXX deg F (xx deg C to XXX	, ,	
		deg C)		
Input f	rom August 11, 2020			
No ind	lustry de facto range			
One p	roduct -30 deg C to 50 deg	C (tested as part of NRTL process); belie	ve this is a consistent range	
used in	ndustry			
There	are products that are outsi	de of this range; temperature rating is an I	NRTL requirements and	
appea	rs on the device markings			
L				
The va	alue will be part of UL 2202	listing – maybe we just document range f	or a given product	
2-3	Physical Security	If enclosure can be opened without a	No standard to reference	
		tool – how is it secured?		
Input f	rom August 11, 2020			
UL 22	02 – has accessibility of liv	e parts requirements that would be met in	listing; mounting means	
require	ements are also covered in	UL 2202		
IEC ar	to UL nave a finger test (III	ve parts access)		
2-4	Cybersecurity	Protection of data and integrity of		
		firmware and operation of EVSE		
Input from August 11, 2020				
NO Sta	No standards – there are some guidelines and Department of Energy funded projects looking at this –			
		Deint materiale dianlava	No standard to reference	
Z-0	Durability	Paint, materials, displays	No standard to reference	
Input from August 11, 2020				
	oz does have labeling dura	ibility requirements (markings), do not cov	er paint of display but	
	required markings			
UL 2202 does have paint/materials/construction analysis (focuses on enclosure)				
roquir	a ov resistance for main	anals, polymer vendors know tims, OL 220.	2 has a OV faulty	
require		iu not cosmetic, conosion is covered		
This w	yould get into being a fabric	eation standard (such as how you apply ha	int)	
11113 VV	build get into being a labit	ation standard (such as now you apply pa	init)	
ASTM	may have paint durability	ratings		
/ 0 / 10	may have paint datability			
Is this	about appearance or funct	ional durabilitv?		
2-6	Minimum Display	Power indicator: graphic display?	No standard to reference	
	Requirements	r oner maleater, grapme aleplay.		
Input f	from August 11, 2020			
	02 has a fault condition dis	play requirement (ground fault or groundir	ng monitor fault)	
02 22				
This fa	alls more inline with a custo	omer feature requirement – probably best r	not to include on this list	
The lane more many war a sustainer routere requirement - probably boot not to molado on the list				
Should	Should we consider – is the "station available"? That would not be covered by UL doc and no existing			
require	requirement			
We'll c	We'll classify this as a feature			

2-7 This is aren't Lack o Vendo	American With Disabilities Act (ADA) based on a height require in line with EV connector a of a pedestal option might i	Must be capable of being installed in compliance with ADA requirements63 ment for controls/displays/cable access; A ictual behavior (plug and un-plug force) mpact ability to be ADA compliant but still nardware CAN be installed in compliance	Vendor documentation; note that ADA is mostly an installation driven requirement, but equipment must provide features to support ADA; no standard to reference DA has force requirements very installation dependent	
No thir	d party certification of ADA	a compliance at hardware level		
#	Qualification	Description	Vetting Method/Notes	
	EVSE PAYMENT and AUTHENTICATION SYSTEMS	This focuses on requirements for local hardware		
3-1	Devices	Do we need to list specific interfaces (such as touchless credit card payment hardware)?	Reference device standards?	
Input f	rom August 11, 2020 eels more like a feature and	d not something that can be set in a requir	ement	
3-2	Protocol	If payments system uses an independent network, what protocol does it use?	Should this be combined with network requirements?	
Input f	Input from August 11, 2020 This is likely to be vendor dependent			
3-3	Security	Local hardware security requirements for payment system	Is PCI compliance applicable at the hardware level?	
Input fi PCI co station This m	Input from August 11, 2020 PCI compliance at the system level would cover this (assuming that payment is made at charging station); not all systems collect payment at charging system			
3-4	Minimum payment		Vendor documentation	
Input fr Genera undue Or we	Input from August 11, 2020 General comment – state level requirements – are they appropriate for this list? Will this become an undue burden to keep up with and maybe should not be included Or we can only reference state requirements and not try to yet those in this document			
#	Qualification	Description	Vetting Method/Notes	
	NETWORKING			
4-1	EVSE Data Available – Format	Detailed description of data that is required to be collected by the EVSE and format of reporting of the data	No standard to reference; some use DOE EV project data format	
Input f	Input from August 11, 2020			
John H docum	 - contacted Idaho Nation nent that includes INL data 	al Lab and was given a note they said cou requirements from the DOE EV Project	ld be considered a public	
·				

⁶³ <u>https://www.ada.gov/</u>

Might need to distinguish collecting the data and reporting the data		
Some elements of data are part of NIST reporting requirements		
Goal is to see if there is an industry de facto set of data being reported in hopes of avoiding custom data requirements in every deployment		
Likely that there will be unique customer needs in the data space		
This was the last item covered on August 11, 2020 meeting (ran out of time) Starting here for August 26, 2020 working group meeting		
There is no standard for this data content		
Could this be provided by OpenADR?		
Is there a way to standardize an API based approach?		
The INL data format is not universally used and vendors have been required to provide other data.		
4-2 EVSE Data – How is data communicated? No standard to reference communication		
Input from August 26,2020 Generally done via web portal: group did not know of a standard form to provide data		
Real time view versus downloading files record – this is focused on the large file downloads		
Does Orange Button or Green Button standards deal with this type of data?		
Also – approach of getting data from an individual device – not likely to be available at this level (includes metadata that a station may not have or know)		
Need to define data – what data? See item 4-1		
Would NOT include getting data directly from a single EVSE or at a site.		
NIST process – inspectors may need to look at and obtain data from individual stations; that is not covered here; covered by other regulations (at state level)		
Consumer – there may be data provided to the consumer (that is not covered here)		
4-1 is not standardized – that likely needs to happen first before you address how data is provided.		
See 4-1 about API method as possibility.		
4-3 Location Map with Realtime Data – Utility Focused Host or system operator tools for charging site management		
Input from August 26, 2020		
Maps in general are driver focused; static data is on the AFDC website (DOE)		
Realtime data is consumer focused – what would be different for utility? See next item.		

4-4	Location Map with	Consumer facing map tools	No standard to reference
	Consumer Focused		
4-5	Phone Support Services	Phone support services requirements	No standard to reference
Input fi	rom August 25, 2020		
On list	due to California's require	ments	upport movies only during
specifi	c business hours	inty? 24/7 for drivers for support? Tech's	upport maybe only during
This m	ay be application specific	– may not always be needed (say, for a be	whind the fence unit)
Custor	ner call in number is only f	or publicly available charging stations	
4-6	Cloud Based API	API features and functions	No standard to reference
	Features for Utility	requirements	
	Interaction - Data		
Input fi	rom August 25, 2020	could reference API canability without no	od for specifics about
commi	inications specifics: does	need to include security	ed for specifics about
Commit			
How de	o utilities connect to field d	evices now (such as thermostats) - is that	t anything we could pull from
here to	use with EVSE? German	ny has established EEBus as means of co	nnectivity – potential option
here			
4-7	Cloud Based API	API demand response requirements	No standard to reference
	Features for Utility	· · · · · · · · · · · · · · · · · · ·	OpenADR2.0b?
	Interaction – Demand		
loout fi	Response		
Input from August 25, 2020 There are some emerging standards but many utilities still "do their own thing"			
There are some emerging standards but many dunites suit do their own thing			
Califor	nia has looked at OpenAD	R as an option	
Califor	nia has looked at OpenAD	R as an option	
Califor Scope	nia has looked at OpenAD of demand response is br	R as an option oad – OpenADR may be limiting	
Califor Scope IEEE 1	nia has looked at OpenAD of demand response is br 547 identified three differe	R as an option oad – OpenADR may be limiting ent protocols – so the option could be to na	ame multiple protocols
Califor Scope IEEE 1	nia has looked at OpenAD of demand response is br 547 identified three differe	R as an option oad – OpenADR may be limiting ent protocols – so the option could be to na eatly	ame multiple protocols
Califor Scope IEEE 1 Industr	nia has looked at OpenAD of demand response is br 547 identified three differe y approaches still vary gre	R as an option oad – OpenADR may be limiting ent protocols – so the option could be to na eatly	ame multiple protocols
Califor Scope IEEE 1 Industr 4-8	nia has looked at OpenAD of demand response is br 547 identified three differe y approaches still vary gre Cloud Based API	R as an option oad – OpenADR may be limiting ent protocols – so the option could be to na eatly API notification requirements	ame multiple protocols No standard to reference
Califor Scope IEEE 1 Industr 4-8	nia has looked at OpenAD of demand response is br 547 identified three differe y approaches still vary gre Cloud Based API Features for Utility	R as an option oad – OpenADR may be limiting ent protocols – so the option could be to na eatly API notification requirements	ame multiple protocols No standard to reference
Califor Scope IEEE 1 Industr 4-8	nia has looked at OpenAD of demand response is br 547 identified three differe y approaches still vary gre Cloud Based API Features for Utility Interaction – User	R as an option oad – OpenADR may be limiting ent protocols – so the option could be to na eatly API notification requirements	ame multiple protocols No standard to reference
Califor Scope IEEE 1 Industr 4-8	nia has looked at OpenAD of demand response is br 547 identified three differe y approaches still vary gre Cloud Based API Features for Utility Interaction – User Event Notification	R as an option oad – OpenADR may be limiting ent protocols – so the option could be to na eatly API notification requirements	ame multiple protocols No standard to reference
Califor Scope IEEE 1 Industr 4-8	nia has looked at OpenAD of demand response is br 547 identified three differe y approaches still vary gre Cloud Based API Features for Utility Interaction – User Event Notification rom August 25, 2020	R as an option oad – OpenADR may be limiting ent protocols – so the option could be to na eatly API notification requirements	ame multiple protocols No standard to reference
Califor Scope IEEE 1 Industr 4-8 Input fi See ot	nia has looked at OpenAD of demand response is br 547 identified three differe y approaches still vary gre Cloud Based API Features for Utility Interaction – User Event Notification rom August 25, 2020 her API related items	R as an option oad – OpenADR may be limiting ent protocols – so the option could be to na eatly API notification requirements	ame multiple protocols No standard to reference
Califor Scope IEEE 1 Industr 4-8 Input fi See ot The big	nia has looked at OpenAD of demand response is br 547 identified three differe y approaches still vary gre Cloud Based API Features for Utility Interaction – User Event Notification rom August 25, 2020 her API related items ggest challenge for API ba	R as an option oad – OpenADR may be limiting ent protocols – so the option could be to na eatly API notification requirements sed connectivity – manufacturers don't kn	me multiple protocols No standard to reference
Califor Scope IEEE 1 Industr 4-8 Input fi See ot The big	nia has looked at OpenAD of demand response is br 547 identified three differe y approaches still vary gre Cloud Based API Features for Utility Interaction – User Event Notification rom August 25, 2020 her API related items ggest challenge for API ba	R as an option oad – OpenADR may be limiting ent protocols – so the option could be to na eatly API notification requirements sed connectivity – manufacturers don't kn	No standard to reference
Califor Scope IEEE 1 Industr 4-8 Input fr See ot The big Value 1 would	nia has looked at OpenAD of demand response is br 547 identified three differe y approaches still vary gre Cloud Based API Features for Utility Interaction – User Event Notification for August 25, 2020 her API related items ggest challenge for API ba may be in listing current ap be defined	R as an option oad – OpenADR may be limiting ent protocols – so the option could be to na eatly API notification requirements sed connectivity – manufacturers don't know	No standard to reference

Could we just define what the things are? Is there a common list of data pieces that utilities want and in what format? Get this list first, then worry about to transport the data.

Another approach is IEEE 1547 model – do we want all EVSEs need the same features/capabilities?

I don't think we are in a mature enough situation to know what features and data might be needed and communicated at this point.

Some of these elements are defined in protocols (like OCPP and OpenADR) - but are different

IEEE 2030.5 and DNP3 are both working on EVSE comms (as is ISO 15118)

We could reach out to Charln and Open Charge Alliance for their input on this topic.

4-9	EVSE to Network Communications - Protocol	Protocol used to manage EVSE from by a charging network	Example: Open Charge Point Protocol Version 1.6? Open Charge Alliance – certified via OCA compliance tool?

Input from August 25, 2020

OCPP is prevalent - but the problem comes in at implementation; not necessarily interoperability is at issue but what portions/parts of the OCPP profiles are implemented.

Focus here is on trying to prevent stranded assets; OCPP 1.6 might be good for today – but need to be flexible (and expect change)

The goal would be to have something we can reference from a standards development organization (SDOs)

Example – "must only use OCPP core profile" – would that lock out other features or prevent innovation - we don't want that

This might be use case dependent - commercial versus residential installations - do we need to distinguish residential from commercial;

May also want to separate AC and DC charging here

Could refer to "Open Network Protocol" to be flexible

If we do reference OCPP - we need to be clear what part of the profile is referenced; how do we deal with extensions used by vendors (DataTransfer messages)

4-10	EVSE to Network Communications –	Network security requirements	No standard to reference NIST 800-53?
	Security -		
	Communications		
Input f	rom August 25, 2020		
PCI co	ompliance is often referenc	ed	
SOC2	compliance is also gaining	some traction	
4-11	EVSE to Network	Specific data security requirements	No standard to reference
	Communications –		
	Security - Data		
Input f	rom August 26, 2020		· ·
Soouri	ty requiremente are likely t	o vary as to socurity requirements based	on the data content

Experience that some users are now asking for compliance to the security requirements that OCA has defined for OCPP 1.6 (there is an OCA white paper on the topic)			
4-12	EVSE to Network Communications – Security – Physical	System physical security requirements	No standard to reference
Input fi This m	rom August 26, 2020 ay belong in the physical r	requirements list and not in networking	
Vendo will hav	r mentioned that some cus ve to rely on physical secu	stomers are requesting data paths that are rity	by definition unsecure and
These installa	might be redundant requir tion)	ements for a secure facility (where this is a	covered by the physical
4-13	EVSE to Network Communications – Remote Firmware Maintenance	Remote firmware updating capability and related requirements	No standard to reference How is this handled when EVSE maker and Network operator are not the same company?
Input fi Not su	rom August 26, 2020 re we can tackle this at thi	s point in time	
4-14	Roaming	Requirements for roaming	Covered by state specific language for California
			OCPI – primary use is roaming; NREL/AFDC starting to use this for data on locations, by Plugshare (Recargo) for real time station status – may be a good standard to align around for roaming
Input fi Is OCF	rom August 26, 2020 Pl adequate and well acce	oted?	· · · · · · · · · · · · · · · · · · ·
Most n	najor networks are building	this interconnectivity	
Need t	o make clear this is for Pu	blic Charging	
Making happer	g this a requirement – can n	be tricky in that it takes more than just a s	ingle vendor to make this
While I result t	While many use OCPI – is it the best method or better to leave more open ended and focus on end result that consumers can roam		
#	Qualification	Description	Vetting Method/Notes
	Customer Experience	These are operation related requirements – not sure they belong in this list	
5-1	Customer Experience – Usability - Diagnostics	Required diagnostic	No standard to reference Is this local or network based – should this be moved under network?

5-2	Customer Experience	Uptime requirements	No standard to reference	
Input f	rom August 26, 2020		How defined?	
mputi	10111 August 20, 2020			
Seeing netwo	Seeing uptime requirements in solicitations but generally vague as to what it means; often uses cell network or other parts of network uptime is reported			
Have s	seen requirements for stati e; maybe think about this fr	on to maintain access and function during om consumer perspective and not networ	short duration network k	
Could (outag	address this with a require es)	ment for memory (or buffering) to support	network connectivity gaps	
There	is also a tie with maintena	nce and upkeep – being proactive to help	address this	
5-3	Customer Experience – Usability – Repair Response	Repair response time to repair	No standard to reference Would need detailed definition. Could be hardware related or network related or both.	
#	Qualification	Description	Vetting Method/Notes	
π	In-Field Feedback from Equipment Performance			
6-1	TBD			
#	Qualification	Description	Votting Mothod/Notos	
π	Reliability	Description	Vetting Method/Notes	
7-1	MTBF	Some form of equipment reliability specification?	Would this be for hardware only or hardware and network?	
Input f	rom August 26, 2020			
This m	nay be more tied to service	contracts and terms of that contract than	upfront requirement	
Preve	ntative maintenance and fig	eld inspection or automate inspection		
Syster interco	System complexity will vary greatly (single AC EVSE versus a multi-charger DC installation with interconnected charging buses and cooling systems)			
Even if you specified MTBF – it isn't likely to result in better field performance – there you need monitoring – sensors and inspection to achieve good MTBF in the field				
One response to this would be to define sensors or automated monitoring; not desirable if this would impact existing equipment in the field – need to be very careful if you went down this path				
This should focus on "used and useful" – a normal utility requirement				
1110 0				
Gener	al construction requiremen	ts are covered in NRTL listing (such as fla	mmability requirements)	

State Specific Requirements for DC Charging State of California

#	Qualification	Description	Vetting Method
	Public EVSE		
	Equipment with a		
	Network		
8-1	Labeling	California Code of Regulations Chapter	Vendor written certification of
		8.3, paragraph 2360.1 ⁶⁴ ; labeling	compliance
		requirements; required by January 1, 2022	
8-2	Fee Disclosure	California Code of Regulations Chapter	Vendor written certification of
		8.3, paragraph 2360.1; fee disclosure	compliance
		requirements; required by January 1, 2022	
8-3	Toll Free Number	California Code of Regulations Chapter	Vendor written certification of
		8.3, paragraph 2360.2; toll free number	compliance
		requirements; A DCFC EVSE installed on	
		or after January 1, 2022, shall comply	
8-4	Subscription	California Code of Regulations Chapter	Vendor written certification of
		8.3, paragraph 2360.2; membership or	compliance
		subscription not required to use charging	
		equipment; A DCFC EVSE installed on or	
		after January 1, 2022, shall comply	
8-5	Credit Card Reader	California Code of Regulations Chapter	
		8.3, paragraph 2360.2; credit card reader	
		requirements; A DC EVSE installed on or	
		after January 1, 2022, shall comply	
8-6	Roaming	California Code of Regulations Chapter	Vendor written certification of
	Agreements	8.3, paragraph 2360.3; EVSP	compliance
		requirements for roaming agreements;	
0.7	Deperting	Required by no later than July 1, 2021	Vender witten certification of
0-7	Reporting	2 paragraph 2260 4: extensive list of	
	Requirements	information that must be provided to the	compliance
		State of California: Applies to all EVSPs	
		operating or intending to operate one or	
		more publicly available DCEC EVSE	
		installed in California Complex set of	
		reporting deadlines	
8-8	NIST Handbook 44	California Department of Food and	Vendor written certification of
	Compliance	Agriculture. Division of Measurement	compliance
		Standards ⁶⁵ - Electric Vehicle Fueling	
		Systems Specifications in the CCR Title 4.	
		§§ 4001 and 4002.11.: requires	
		compliance with NIST Handbook 44	
		sections pertaining to sale of electricity as	
		a fuel (as amended by the State of	
		California); include metering accuracy	
		requirements and timeline for compliance	
8-9	California Energy	California Energy Commission proposed	Vendor provided
	Commission – Title	data collection requirements; Title 20;	documentation
	20 EVSE Data	Docket number 18-OIR-01; paragraph	
	Requirements	1386	

⁶⁴ California Air Resources Board, <u>https://ww2.arb.ca.gov/sites/default/files/2020-06/evse_fro_ac.pdf</u>

⁶⁵ <u>https://www.cdfa.ca.gov/dms/regulations.html</u>

	See section 7 for the proposed	
	Commission language.	

6 IDAHO NATIONAL LAB REQUIREMENTS LIST

This section contains the data requirements list published by Idaho national Lab (INL) for the Department of Energy (DOE) EV Project undertaken in the 2011 timeframe. This in reference to Criteria 4-1 for network data collection.

Idaho National Laboratory Charging Infrastructure Data Collection Requirements

Background

The EV Project is an electric drive vehicle charging infrastructure deployment, demonstration and evaluation project led by ECOtality North America and major project partners Nissan North America, General Motors and the Idaho National Laboratory (INL). This project focuses on the evaluation of charging infrastructure placement, utilization, practices, use patterns and behaviors by drivers of 5,700 Nissan Leaf electric vehicles (EVs) and 2,600 Chevrolet Volt extended-range electric vehicles (EREVs). These drivers will charge their EVs or EREVs at approximately 15,000 private, fleet and public chargers that will be deployed as part of ECOtality's EV Project, which is an American Recovery and Reinvestment Act (ARRA) funded activity sponsored by the U.S. Department of Energy's (DOE) Vehicle Technologies Program.

The primary requirement of the ECOtality EV Project is the evaluation of the deployed charging infrastructure which requires significant data collection, analysis and reporting by the Project partners, with INL having final analysis and reporting responsibility. In addition to data collected from the 8,300 onboard-vehicle data collection systems, all of the EV Project's charging infrastructure will be instrumented with data collection and data transmission capabilities. The vast majority of the charging infrastructure will consist of Level 2 (208/240 volt) electric vehicle supply equipment (EVSE) along with some DC fast chargers. The Level 2 EVSE will provide electricity to the Leaf's and Volt's onboard Level 2 chargers, while the DC fast chargers will be located off-board the vehicles.

INL Data Collection Requirements

If non-EV Project organizations, such as local or state government entities, educational institutions, or Clean Cities organizations wish to deploy additional charging infrastructure and provide charging information data, this participation is welcome by the INL. However, any Level 2 EVSE or DC fast chargers deployed by 3rd party organizations must be deployed with data collection, handling, and transmission capabilities similar to the infrastructure deployed by the ECOtality EV Project participants. These 3rd party-funded and provided capabilities must include:

- Maintaining their own data collection servers for storing charging infrastructure events information
- Managing and conducting the data transfer communications between charging infrastructure (i.e. EVSE units) and data collection servers
- Providing staff to maintain their own data server(s), the data communications process, and their portion of this data collection effort
- Each 3rd party EVSE must provide the following parameters per charging event (this is a mandatory requirement):

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- Unique ID for Plug-in Event
- Unique ID for Charge Event(s)
- Unique ID Identifying the EVSE may not change

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- Vehicle Connect Time (this is the start of the Plug-in Event)
- Vehicle Disconnect Time (this is the end of the Plug-in Event)
- Charge Start Time (i.e. time stamp when EVSE begins to transfer power)
- Charge End Time (i.e. time stamp when EVSE stops transferring power)
- Average Power (AC kW) per charging event
- Total Energy (AC kWh) per charging event
- 15-Minute Interval Start Time (where the first 15-Minute Interval Start Time is equal to the Charge Start Time)
- 15-Minute Interval End Time (where the last 15-Minute Interval End Time is equal to the Charge End Time; and the last interval may not last the full 15 minutes)
- Rolling 15-Minute Average Power (AC kW, captured for each 15-minute interval)
- Rolling 15-Minute Peak Power (AC kW, captured for each 15-minute interval)
- All Time Stamps are defined as a year, month, day, hour, minute, and second at the time of each entry. The time zone should be local time for EVSE. If it is not possible to log local time, all vehicles shall have a common time zone (GMT time zone is preferred). Time zone must be identified.
- Provide a data transfer portal that either 1) allows INL to initiate contact and download (i.e. pull) charging infrastructure data or 2) pushes charging infrastructure data to an INL server per a fixed schedule.

Before data collection begins, the INL also requires the following information:

- Unique Identifier for the EVSE
- GPS Location of the EVSE in latitude and longitude in decimal degrees to 5 decimal places
- · Standard time zone offset from GMT for the time zone in which EVSE is installed
- EVSE specifications
 - EVSE voltage and current rating
 - EVSE type (residential or commercial/public)
- Assurance that the EVSE meets all applicable codes and standards, and is UL or other test laboratory listed. See Appendix A for Level 2 applicable requirements.
- 3rd Party Contact Information responsible for maintaining the data collection and transfer process – Contact Person, Contact Email, Contact Physical Address, Company Name, Contact Phone Number.

The goal of the above capabilities is the requirement for each 3rd party installing infrastructure to be able to provide INL with data in the same exact method as the core EV Project participants, and this requires each 3rd party to manage and maintain their own data and data collection efforts from each individual EVSE to the 3rd party data collection system.

EVSE units will transfer data to a 3rd party data collection organization in a manner and frequency of their choice. However, this data must be provided as weekly data transfers to INL via SFTP (Secure File Transfer Protocol). The file format will be CSV (comma separated value). This is the preferred method for the INL to receive data from organizations installing EVSE provided by 3rd party companies.

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If the 3rd party company installing the additional EVSE wishes to provide INL with real time data, the 3rd party will be required to have an IT programmer to develop and maintain a real time interface to the EVSE and will also be required to fund the INL to provide this capability. However, this funding to the INL will require full cost recovery. This interface will enable the INL to "call" the unit and retrieve data. INL will communicate with your IT programmer regarding additional requirements. However, this is not the preferred method of data collection and it will be the most costly to the 3rd party companies.

The ARRA funding provided by DOE is limited and targeted, and it does not provide for data collection efforts beyond the specific scope in the award to support the original 15,300 EVSE and fast charger infrastructure deployment.

Summary

Additional charging infrastructure deployments, installed by 3rd parties, are welcome as this will provide a more infrastructure-rich charging environment. However, all charging infrastructure must be safe and capable of providing the same charging event information, in the same format, and at the same frequency as the infrastructure installed by the ECOtality EV Project participants. The DOE- provided scope for this ARRA funded project has very defined data collection, evaluation, and dissemination requirements for a massive amount of charging infrastructure. These requirements and the mass of instrumented vehicles and charging infrastructure necessitate that the data handling and reporting be conducted in the most economical and similar manner possible.

INL Contact

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7 PROPOSED DATA COLLECTION REQUIREMENTS FROM CALIFORNIA ENERGY COMMISSION

Proposed data collection requirements from California Energy Commission⁶⁶. Proposed language for California Title 20 – snip of language for electric vehicle supply equipment (paragraph 1386):

DOCKETED	
Docket Number:	18-OIR-01
Project Title:	Energy Data Collection - Phase 2
TN #:	235223
Document Title:	Proposed Language
Description:	Chapter 3. Data Collection Article 1. Quarterly Fuel and Energy Reports
Filer:	Barbara Crume
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	10/13/2020 11:55:19 AM
Docketed Date:	10/13/2020

§1386 EVSE Session Data Reporting and Criteria

(a) Information defined in this section shall be submitted quarterly. Reports filed pursuant to this section shall be submitted no later than thirty (30) calendar days following the end of each quarter as defined:

- (1) Quarter one reporting will be all of January, February, and March
- (2) Quarter two reporting will be all of April, May, June
- (3) Quarter three reporting will be all of July, August, and September
- (4) Quarter four reporting will be all of October, November, and December

(b) This "dynamic" data is related to charging sessions for each EVSE. For each charging session, report the following information:

(1) EVSP Station ID – a station identifier used by the EVSP

(2) EVSE ID

(3) EVSE Port ID – unique identifier of the port associated with the EVSE at the charging station for the port or transmitter

⁶⁶ https://www.energy.ca.gov/event/workshop/2020-10/commissioner-workshop-title-20-data-collection-regulationssupport-new

- (4) Session: Start Date and Start Time
- (5) Session: End Date and End Time

(6) Port Standard Used (e.g. J-1772, CCS1 Combo, CCS2 Combo, CHAdeMO, Tesla, wireless, etc.)

- (7) Duration of Charging: Start Date and Start Time
- (8) Duration of Charging: End Date and End Time

(9) Sustained Peak Power (kW) Output – The highest power output provided to the EV during the charging session

(10) Total Energy Discharged (kWh) by EVSE – Total energy that passed through from the EVSE into the EV

(11) Payment Method Used (e.g. cash, credit card, subscription, mobile payment, etc.)

(12) Session Price Paid (US dollars) – Total price that the user paid for the session

(13) Total Energy (kWh) Discharged by EV – Energy transferred from EV battery to EVSE for V2X services

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