IEEE1547 Vs J3072 Vs Rule 21 Comparison

Rule 21 Working Group 3 – Issue 23

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Topics For Discussion

This presentation is for discussion purposes only and does not represent a final proposal/position for SCE

Section V2G-AC PEV

- Jurisdiction/Governing Boards
- Scope Descriptions
- Conformance Tensting
- J3072 Area of Focus – EVSE-V2G AC Communication
- EVSE to V2G AC Communiction Interface
- Areas to Consider for Standards & V2G Deployment

Section V2G-DC PEV

- V2G-DC systems requirements and transition
- Enabling Discharing Capability

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Disclaimer

SCE has collaborated with SMEs from SAE J3072 and IEEE standards on the development of this material. The information provided in this material is SCE's best understanding of the various standards which may not always fully illustrate an accurate comparison.

Further, by this presentation, SCE **does not endorse** the adequacy of SAE J3072 standard, testing or certification for interconnection requirements under Rule 21. SCE simply presents the information as SCE currently understands the standards be.

SCE notes that with this investigation it became evident that there is a need for further collaboration between Automotive Standards technical groups (SAE) and stationary DER technical standards group (IEEE 1547). SCE notes that for California to be successful in the deployment of V2G systems, it will be essential for industry technical leaders from both vehicle and stationary systems to engage in the development or updates to relevant standards that will allow for safety interconnection of V2G systems.

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Jurisdiction or Governing Board

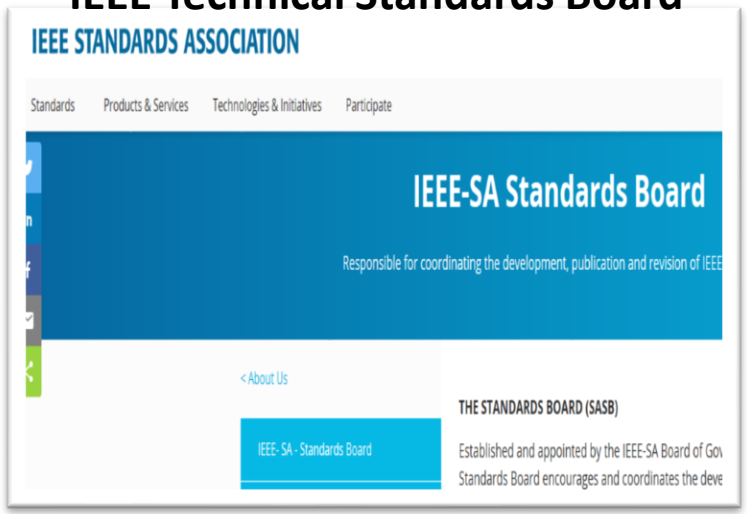
Surface Vehicle Standard
J3072 - 2015 Edition

SAE Technical Standards Board

Updates: 5 year review required or as required by industry. Hank McGlynn current document leader will support opening for review.

IEEE1547 - 2018 Edition
IEEE1547.1 – 2019/2020
TBD

IEEE Technical Standards Board



Updates: Every as industry request with approved Project (reaffirmed every 5 years)
Authorization Request from IEEE SCC21

Rule 21
Phase I – 2017
Phase II & III - 2019

California PUC

Updates: PUC opens OIR based on needs and updates completed with stakeholder participation

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Standard Scope Description

Surface Vehicle Standard J3072 - 2015 Edition

Establishes Interconnection Requirements for Utility Interactive Inverter Systems which are Integrated into a PEV (V2G-AC)

Notes

- V2G-DC PEVs out of scope
- Focus only on Information Exchange between V2G-AC PEV and EVSE as well as configuration management of the onboard inverter
- Referenced IEEE1547 for testing criteria but does not follow certification requirements as require in R21 for stationary inverters

IEEE1547 - 2018 Edition
IEEE1547.1 – 2019/2020
TBD

Establishes Criteria and Requirements for Interconnection of DERs with the EPS and Associated Interfaces.

Rule 21
Phase I – 2017
Phase II & III - 2019

Sets Interconnection, Operating and Metering Requirements for Generating Facilities Connected to the grid

Rule 21 relies heavily on IEEE1547/.1

Currently using UL1741/UL1741SA

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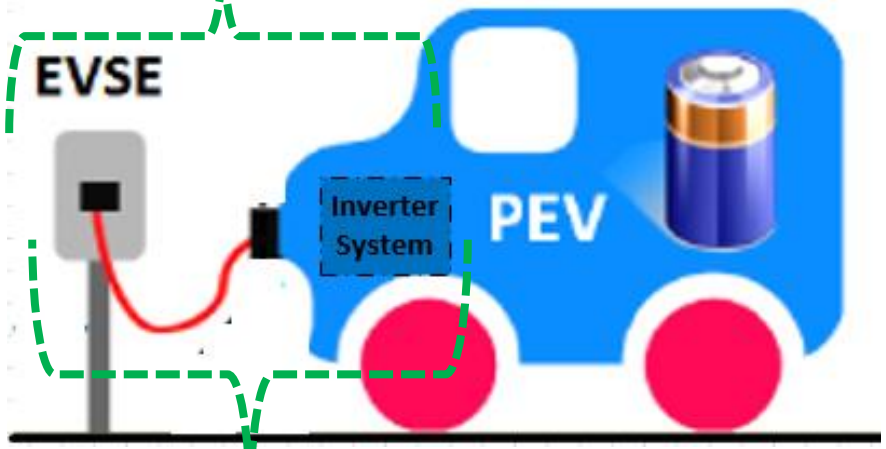
Conformance Testing

V2G AC PEV/EVSE Conformance Testing Standards*

J3072 Section 4.6 Standard*

Performed by EVSE Manufacturer or NRTL*



Information Exchange: J3072*
Inverter System: IEEE 1547/IEEE1547.1 – 2003

Performed by Vehicle Manufacturer

* ONLY 4.6 - EVSE Authorization of PEV to Discharge

Smart Inverter Conformance Testing Standards

Rule 21
UL 1741
UL 1741 SA

performed by OSHA approved NRTLs
Interim method while IEEE1547.1 is approved and Incorporated to UL 1741

AC / DC Inverter

DC Energy Source

UL 1741

IEEE1547 - 2018 Edition
IEEE1547.1 – 2019/2020 TBD

Certification By OSHA Approved NRTLs

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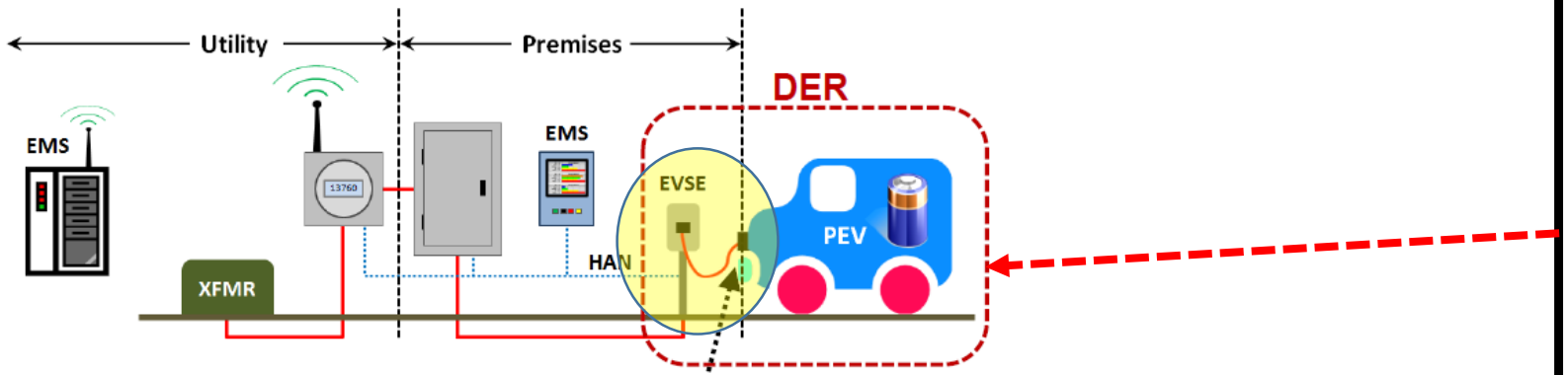
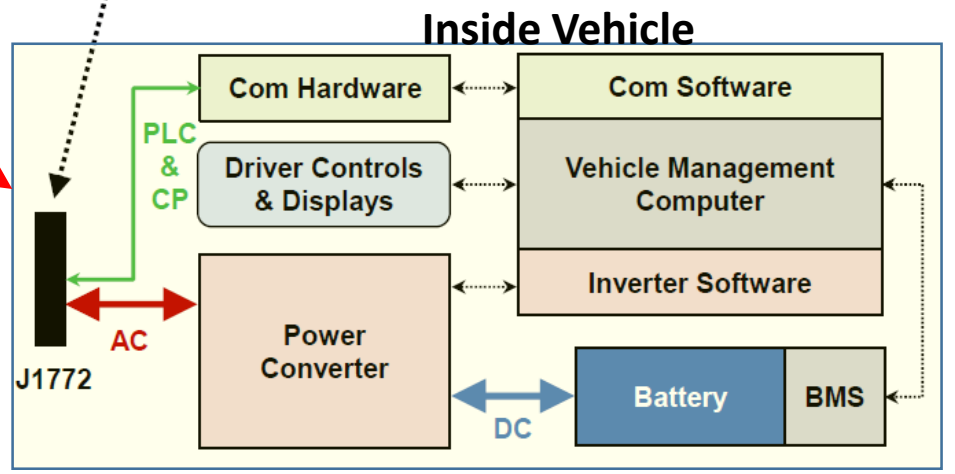
J3072 Focus – EVSE to Vehicle Communication

Illustration Source: AEYCH – Hank McGlynn

Roaming Onboard Inverter System (V2G-AC)

AEYCH





- Defines requirements for the information that must be shared between the EVSE and the roaming onboard V2G-AC PEV Inverter System for the purposes of setting up the onboard inverter system for discharging at the EVSE site.
- Requires the use of IEEE 2030.5

Inverter System
- Uses IEEE1547 2003 and associated IEEE1547.1 testing standards
- Performed by manufacturer not by NRTL as currently required in Rule 21

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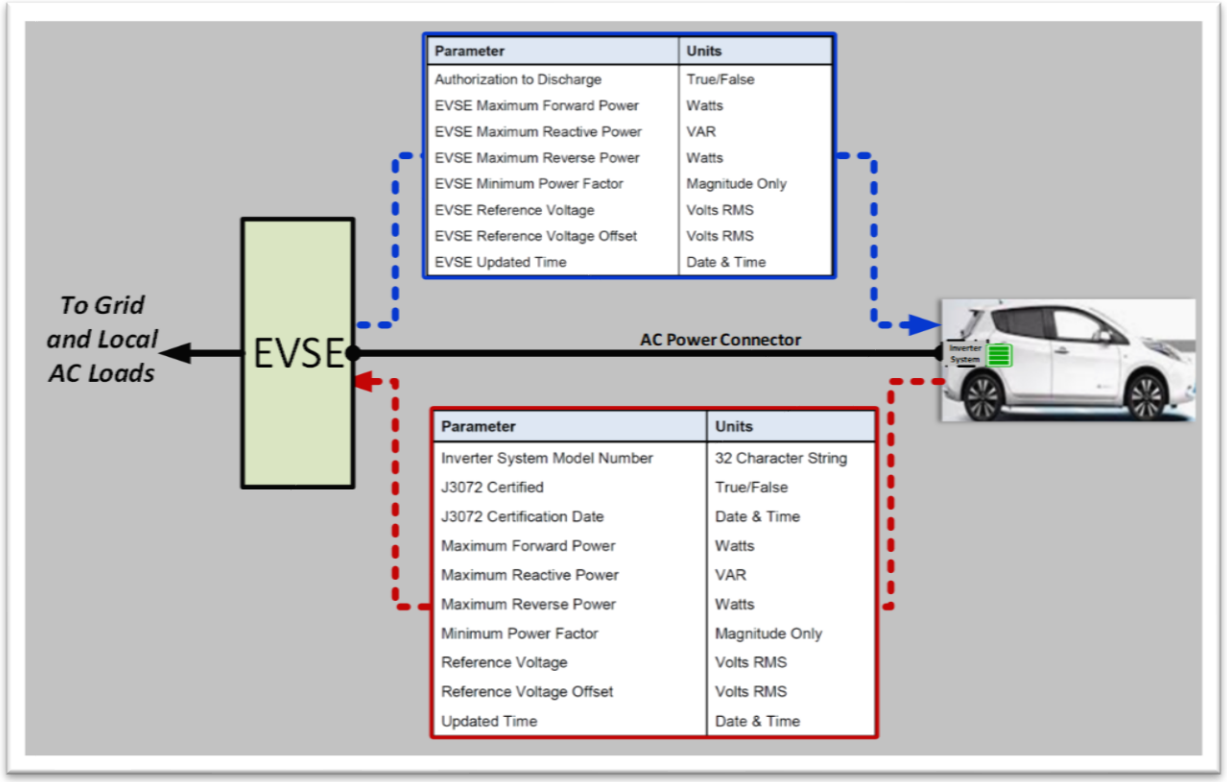
EVSE to V2G AC PEV Communication Interface



Section 4.6 - EVSE Authorization of PEV

- Local Facility Information Is Passed From EVSE to V2G PEV (such as reference voltage, Max Reverse Power, etc.)
- PEV parameters passed from V2G to EVSE (such as certification information, inverter system model #)
- EVSE Authorizes the V2G to *discharge* up to limit provided by EVSE
- EVSE monitors and disconnects if PEV violates the limits

Areas to need standards updates

- Unclear as which parameter the inverter changes as response to EVSE received information. For example – IEEE1547 -2003 does not have a "Limit Real Power" function
- Unclear which reactive function is applied (max reactive power or PF) and if it applies to both power flow directions.
- Unclear as to how and when the EVSE takes corrective actions
- Unclear as if performance is tested along with EVSE communications (Does the test include that the inverter actually responded to a command sent by the EVSE?)
- Unclear as to how the EVSE receives the parameters to use at the site

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Areas To Consider for Standard & V2G AC Deployment

- J3072 Standard should be reviewed and updated to clarify codes and standards applicable for EVSE testing and certification requiremens
- J3072 Standard should independently verify V2G PEV certification
- Conform J3072 parameters for EVSE and Inverter System with IEEE 1547 standard
- Clarify the correlation between the various V2G and EVSE standards to IEEE standards
  - J3072 (Surface Vehicle Standard)
  - UL2594 (Standard for Electric Vehicle Supply Equipment)
  - J2836 – Communication and Interoperability (Technical Information Report)
  - IEEE 2030.5
- J3072 standard should be updated to require EVSE to verify that all elements of the inverter system are certified to insure system are not inadvertently replaced during vehicle maintenance including any changes to operating firmware and any inverter configuration files

V2G AC PEV implementation road map via SIGW-SAE Working Group to develop and provide PUC with recommendation on implementation of V2G-AC PEV in California

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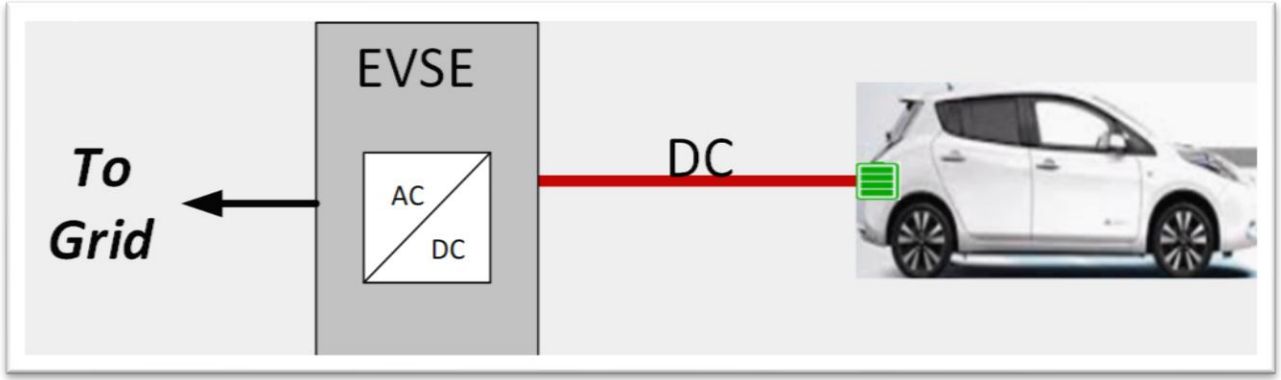
V2G DC Systems

- Inverter is part of the EVSE
- Bi-directional capable EVSE must be certified by NRTLs regardless of bi-direction activation
- EVSE manufacturers/NRTLs to follow labeling and listing for EVSE equivalent to storage inverters



Near Term (2019-2021)

Reverse (discharging) – Conformance Testing
- NRTL certification using IEEE1547/IEEE1547.1 (2003) should be allowed
- UL1741 SA certification should not be required (allowed)

Reverse Blocking – (charging only) – Conformance Testing
- Rule 21 Non-export AC/DC converter definition requirements
- Need to determine testing for mode selection

Forward (charging) - Conformance Testing
- Not Applicable to Rule 21

Transition To New Requirements (~2021)

Reverse (discharging) – Conformance Testing
- NRTL certification using IEEE1547 (2018)/IEEE1547.1 (2019)
- Allow one year from approval of IEEE1547.1 (2019) for industry deployment

Reverse Blocking – (charging only) – Conformance Testing
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- Need to determine testing for mode selection

Forward (charging) - Conformance Testing
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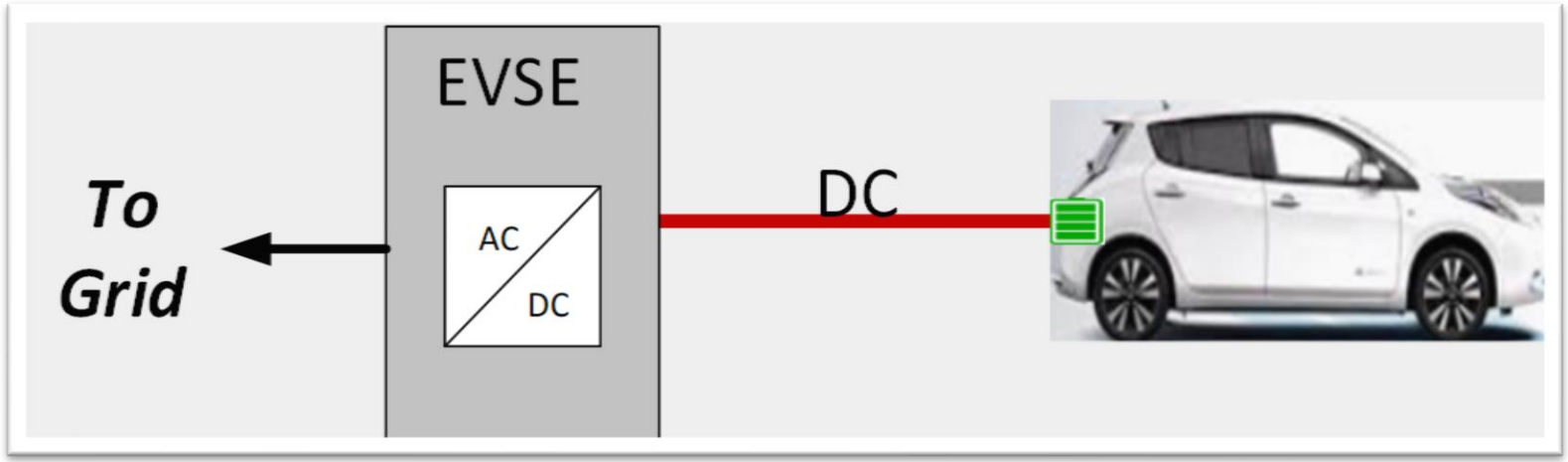
Enabling Discharging Capability



Customer Responsibility

- EVSE should be shipped with "Reverse Block"- "Forward" Only enabled
- Requires owner to call EVSE manufacturer OEM for temporary password (See Electric Current UL CRD for other options)
- Need to verify compliance with California Health and Safety Code Section 119085(b)
- Need to verify compliance with Account for NEC 705.6 – Equipment Approval

Interconnection Request

- Owner responsible for applying for interconnection and must receive utility PTO prior to enabling the bi-directional function
- Owner is responsible for programming EVSE and enable bi-directional ONLY after receiving PTO

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Discussion