

Electric Vehicle Supply Equipment Standards Reference List

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The following information is intended to be a guide to any new electric vehicle (EV) charging equipment manufacturer or distributor. This list is not intended to be comprehensive; it is subject to change and is for informative purposes only.

ACRONYMS AND DEFINITIONS

ANSI	American National Standards Institute
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
NFPA	National Fire Protection Association
SAE	Society for Automotive Engineers
UL	Underwriter Laboratories (Safety Certification Company)

LEVEL 2 ALTERNATING CURRENT (AC) CONDUCTIVE EVSE

The following standards may apply to Level 2 Electric Vehicle Supply Equipment (EVSE).		
ANSI/UL Standards	<ul style="list-style-type: none"> • UL 2202 • UL 2594-2 • UL 2231-12 • UL 2231-22 	<ul style="list-style-type: none"> • Electric Vehicle Charging System Equipment (AC to DC) • Electric Vehicle Supply Equipment (AC to AC) • Personnel Protection Systems for Electric Vehicle Supply Circuits – General ANSI/Requirements (referred to in UL 2202/UL 2594) • Personnel Protection Systems for Electric Vehicle Supply Circuits – Protective Devices for Use in Charging Systems (referred to in UL 2202/UL 2594)
SAE Standards	<ul style="list-style-type: none"> • SAE J1772 / CCS1 • SAE J2293 • SAE J2894 • SAE J2931 • SAE J2953 	<ul style="list-style-type: none"> • SAE Electric Vehicle and Plug in Hybrid Electric Vehicle Conductive Charge Coupler • Energy Transfer System for Electric Vehicles - Part 1: Functional Requirements and System Architectures • Power Quality Requirements for Plug-In Electric Vehicle Chargers • Digital Communications for Plug-in Electric Vehicles • Plug-In Electric Vehicle (PEV) Interoperability with Electric Vehicle

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		Supply Equipment (EVSE)
Communication Standards	<ul style="list-style-type: none"> • ISO 15118 • OCA certification • OCPP 1.6 or later • OCPP 2.0.1 	<ul style="list-style-type: none"> • ISO 15118 specifies the communication between Electric Vehicles (EV), including Battery Electric Vehicles and Plug-In Hybrid Electric Vehicles, and the Electric Vehicle Supply Equipment (EVSE). • Open Charge Alliance • Open Charge Point Protocol
NFPA	<ul style="list-style-type: none"> • NFPA 1 • NFPA 70 • NEC 626 	<ul style="list-style-type: none"> • Fire Code • National Electrical Code • Electrified Truck Parking Spaces
ISO / IEC	<ul style="list-style-type: none"> • ISO 22512 • IEC 61851-1 • IEC 61851-22 • IEC62752 	<ul style="list-style-type: none"> • Telecommunications and information exchange between systems • Electric Vehicle Conductive Charging Systems – General Requirements • Electric Vehicle Conductive Charging Systems – AC Electric Vehicle Charging Station • In-cable control and protection device for mode 2 charging of electric road vehicles (IC-CPD)

DIRECT CURRENT (DC) CONDUCTIVE EVSE

The following standards may apply to DC Electric Vehicle Supply Equipment (EVSE).		
ANSI/UL Standards	<ul style="list-style-type: none"> • UL 2202 • UL 2231-12 • UL 2231-22 • UL 2251-2 	<ul style="list-style-type: none"> • Electric Vehicle Charging System Equipment (AC to DC) • Personnel Protection Systems for Electric Vehicle Supply Circuits – General ANSI/Requirements (referred to in UL 2202/UL 2594) • Personnel Protection Systems for Electric Vehicle Supply Circuits – Protective Devices for Use in Charging Systems (referred to in UL 2202/UL 2594) • Electric Vehicle Plugs, Receptacles and Couplers
SAE Standards	<ul style="list-style-type: none"> • SAE J1772 • SAE J2293 • SAE J2894 • SAE J2931 • SAE J2953 	<ul style="list-style-type: none"> • SAE Electric Vehicle and Plug in Hybrid Electric Vehicle Conductive Charge Coupler • Energy Transfer System for Electric Vehicles - Part 1: Functional Requirements and System Architectures • Power Quality Requirements for Plug-In Electric Vehicle Chargers • Digital Communications for Plug-in



		<p>Electric Vehicles</p> <ul style="list-style-type: none"> • Plug-In Electric Vehicle (PEV) Interoperability with Electric Vehicle Supply Equipment (EVSE)
Communication Standards	<ul style="list-style-type: none"> • ISO 15118 • OCA certification • OCPP 1.6 or later • OCPP 2.0.1 	<ul style="list-style-type: none"> • ISO 15118 specifies the communication between Electric Vehicles (EV), including Battery Electric Vehicles and Plug-In Hybrid Electric Vehicles, and the Electric Vehicle Supply Equipment (EVSE). • Open Charge Alliance • Open Charge Point Protocol
NFPA	<ul style="list-style-type: none"> • NFPA 1 • NFPA 70 • NEC 626 	<ul style="list-style-type: none"> • Fire Code • National Electrical Code • Electrified Truck Parking Spaces
IEC / ISO	<ul style="list-style-type: none"> • IEC 61851-1 • IEC 61851-23 • IEC 62995 	<ul style="list-style-type: none"> • Electric Vehicle Conductive Charging Systems – General Requirements • Electric Vehicle Conductive Charging Systems – DC Electric Vehicle Charging Station • Residual Direct Current Detecting Device (RDC-DD) to be used for Mode 3 Charging of Electric Vehicles

VEHICLE-2-GRID BI-DIRECTIONAL CHARGING STANDARDS

The following standards may apply to V2G Electric Vehicle Supply Equipment (EVSE).		
V2G-DC		
ANSI/UL Standards	<ul style="list-style-type: none"> • UL1741 SA/SB 	<ul style="list-style-type: none"> • Current and existing standard for V2G deployment. <ul style="list-style-type: none"> ○ <i>Integrates UL 9741 Standard for Safety for Electric Vehicle Power Export Equipment (EVPE)</i> ○ <i>Certifies IEEE 1547 Compliance</i>
SAE Standards	<ul style="list-style-type: none"> • SAE J2847 – 2 	<ul style="list-style-type: none"> • Communication Between Plug-In Vehicles and Off-Board DC Chargers <ul style="list-style-type: none"> ○ <i>Uses ISO 15118-2 schema with negative signals for Power and Current for Bi-directional energy transfer.</i> ○ <i>Included ISO 15118-20 Light allowing TLS 1.2 security (BPT and Private application)</i>
IEEE Standards	<ul style="list-style-type: none"> • IEEE 2030.5 	<ul style="list-style-type: none"> • IEEE Standard for Smart Energy Profile



		Application Protocol
IEC/ISO	<ul style="list-style-type: none"> ISO 15118 	<ul style="list-style-type: none"> specifies the communication between Electric Vehicles (EV), including Battery Electric Vehicles and Plug-In Hybrid Electric Vehicles, and the Electric Vehicle Supply Equipment (EVSE)
NFPA	<ul style="list-style-type: none"> NFPA 1 NFPA 70 NEC 626 	<ul style="list-style-type: none"> Fire Code National Electrical Code Electrified Truck Parking Spaces
V2G-AC		
ANSI/UL Standards	<ul style="list-style-type: none"> UL1741 SC 	<ul style="list-style-type: none"> Bidirectional Electric Vehicle Supply Equipment (BEVSE) / Interconnection Systems Equipment (ISE) for EVs with Bidirectional Onboard Inverters
SAE Standards	<ul style="list-style-type: none"> SAE J2847 – 3 SAE J3072 	<ul style="list-style-type: none"> Communication for Plug-in Vehicles as a Distributed Energy Resource Interconnection requirement for on-board utility interactive inverter (EV OEM Standard for V2G connectivity) <ul style="list-style-type: none"> Requires IEEE 1547 conformance in onboard grid support inverters Communication profile conformant to SAE J3072 (IEEE 2030.5 and SunSpec Modbus)
IEEE Standards	<ul style="list-style-type: none"> IEEE 2030.5 IEEE 1547 	<ul style="list-style-type: none"> IEEE Standard for Smart Energy Profile Application Protocol Utility standard for V2G connectivity
IEC/ISO	<ul style="list-style-type: none"> ISO 15118 	<ul style="list-style-type: none"> Specifies the communication between Electric Vehicles (EV), including Battery Electric Vehicles and Plug-In Hybrid Electric Vehicles, and the Electric Vehicle Supply Equipment (EVSE)
NFPA	<ul style="list-style-type: none"> NFPA 1 NFPA 70 NEC 626 	<ul style="list-style-type: none"> Fire Code National Electrical Code Electrified Truck Parking Spaces

WIRELESS POWER TRANSFER (WPT) (INDUCTIVE CHARGING) STANDARDS

The following standards may apply to Electric Vehicle Supply Equipment (EVSE) with Inductive Charging Capabilities.		
ANSI/UL Standards	<ul style="list-style-type: none"> UL 2750 	<ul style="list-style-type: none"> Outline of Investigation for Wireless Power Transfer (WPT) Equipment for electric vehicles
SAE Standards	<ul style="list-style-type: none"> SAE 2954-1 SAE 2954-2 SAE 2954-2 TIR 	<ul style="list-style-type: none"> WPT for Light-Duty Plug-In/EV and Alignment Methodology Static WPT for Medium/Heavy-Duty Electric



	<ul style="list-style-type: none"> • SAE 2954-3 • SAE 2847-6 	<p>Vehicles</p> <ul style="list-style-type: none"> • WPT and Alignment for Medium/Heavy-Duty Applications • Dynamic WPT for Light and Medium/Heavy-Duty Vehicles • Wireless communication for control of the WPT charging process
ISO/IEC	<ul style="list-style-type: none"> • ISO 15118-20 • IEC 61980-1 • IEC 61980-2 • IEC 61980-4 • IEC 61980-5 	<ul style="list-style-type: none"> • 2nd generation network layer and application layer requirements • General Requirement - Electric Vehicle Wireless Power Transfer (WPT) Systems • Specific requirements for magnetic field - WPT system communication and activities • Static High Power Wireless Power Transfer • Dynamic Wireless Power Transfer
NFPA	<ul style="list-style-type: none"> • NFPA 1 • NFPA 70 • NEC 626 	<ul style="list-style-type: none"> • Fire Code • National Electrical Code • Electrified Truck Parking Spaces

