

NEMA Perspectives-Codes & Standards for Common & Smart Charging Infrastructure

January 19, 2023

ASEAN – U.S EV Workshop



Agenda

Bipartisan Infrastructure Law and its Impacts

EV Infrastructure Perspective

NEMA EVSE 1 Standard

EV Ready/EV Capable in relevant Codes

NEC Article 625

NEMA TS 10 Standard



The Rise of Electric Cars

By 2022 electric vehicles will cost the same as their internal-combustion counterparts. That's the point of liftoff for sales.



Sources: Data compiled by Bloomberg New Energy Finance, Marklines

Bloomberg



Impacts of the Bipartisan Infrastructure Law (BIL)

Joint Office of Energy and Transportation-\$5 billion over the next five years to help states create a network of EV charging stations along designated “Alternative Fuel Corridors.”

Funds will be available under the new National Electric Vehicle Infrastructure (NEVI) Formula Program. \$600 million will be available in 2022.

State Energy Offices will receive \$500 million in U.S. State Energy Program (SEP) funds through the BIL to adequately plan for and deploy funds to maximize impact and enable clean energy deployment and economic growth.



**Notable
activities
resulting
from the
Bipartisan
Infrastructure
Law (BIL)**

- Creation of the new Joint Office of Energy/Transportation
<https://driveelectric.gov/>
- ANSI Roadmap of Standards and Codes for Electric Vehicles at Scale
<https://www.ansi.org/news/standards-news/all-news/2022/06/6-9-22-ansi-ev-roadmap-scale>



EV Charging Infrastructure

Critical component of the charging experience

Not just a piece of charging equipment

Combination of hardware, software, cables, and cable management integrated into a network

Infrastructure includes additional critical site elements such as lighting, controls, and other communication devices

Interconnected with the electrical distribution grid

“Customer side” power distribution equipment

On-site battery storage that may be distinct from the electrical systems of a building




EV Charging Infrastructure

- Should also be
 - Interoperable
 - Networked and connected to the cloud
 - Compliant with appropriate safety standards (i.e., UL 2202) and building codes (i.e., NEC 625)
 - Utilizing foundational cybersecurity principles (boot security, secure over the air updates, secure customer information)

NEMA EVSE 1

A Charging Network Interoperability Standard

- Describes a protocol for authenticating EV charging service requests using Radio Frequency Identification (RFID)–type credentials
 - Assurance to the EV charging network that the EV driver is the correct authorized party
 - EV driver has confidence that transactions have not been authenticated using forged or fraudulent credentials
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NEMA EVSE 1 A Charging Network Interoperability Standard

- Relationship to ISO 15118
- Electric Vehicle Charging Stations (EVCS) can support contactless authentication and the ISO 15118 standard
- User can choose any method based up their EV communication capabilities, the EVCS features, their EV charging network affiliation, and their preferred choice of accounting or payment method
- [NEMA EVSE 1 - EV Charging Network Interoperability Standard](#)

EV Ready and EV Capable

Key component in EV charging infrastructure-
EV Ready and EV Capable requirements into
both commercial and residential building and
energy codes



*Essentially future proofing buildings so
they can accommodate an EVCS*

EV Ready and EV Capable

EV Ready- parking space that includes listed raceway (approved wiring methods), sufficient electrical panel service capacity, overcurrent protection devices, wire and suitable termination points such as a junction box with a service loop or directly landed within an EVCS



EV Capable- parking space that includes listed raceway (approved wiring methods) and electrical capacity (breaker space) allocated in a subpanel to accommodate future EVCS

EV Ready and EV Capable

- Several municipalities, community improvement districts, and other jurisdictions have mandatory EV-Ready requirements
(<https://www.swenergy.org/transportation/electric-vehicles/building-codes>)
- NEMA efforts to incorporate EV Ready Requirements into the 2024 International Energy Conservation Code (IECC)
 - Requirement for all one- and two-family dwellings, townhomes, and low-rise multi-family dwellings to provide an EV-capable parking space for each dwelling unit

National Electrical Code

Article 625: Electric Vehicle Power Transfer

- General
- Equipment Construction
- Installation



National Electrical Code

- 625.1 Scope
 - The provisions of this article cover the electrical conductors and equipment connecting an electric vehicle to premises wiring for the purposes of charging, power export, or bidirectional current flow.
- 625.2 Definitions
 - Electric Vehicle Supply Equipment (EVSE)
 - Electric Vehicle Connector
 - Output Cable to the Electric Vehicle

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NEC 625, Part II- Equipment Construction

- 6.25.17 Cords and Cables
- 6.25.22 Personal Protection System
- 625.40 Electric Vehicle Branch Circuit
- 625.41 Overcurrent Protection



NEC 625, Part III- Installation

- 625.43 Disconnecting
- 625.44 Equipment Connection
- 625.47 Multiple Feeder or Branch Circuits
- 625.54 Ground-Fault Circuit-Interrupter Protection for Personnel
- 625.56 Receptacle Enclosures



NEMA TS 10 Standard

- Connected Vehicle Infrastructure- Roadside Equipment
- Enables coexistence of multiple communication technologies of how vehicles (including EVs) communicate with roadside infrastructure
- Focused on solutions to specific applications
 - Emergency Vehicle Preemption
 - Entering School/Work Zone
 - Pedestrian Crossing Ahead
 - Many others
- [NEMA TS 10- Connected Vehicle Infrastructure- Roadside Equipment](#)

Thank-you

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