Electric Vehicle
EVITP
Infrastructure Training Program

2017 *NEC* Review

3.0 - 2017 NEC Review Sections

3.1 2017 *NEC* Article 90

3.2 2017 *NEC* Chapter 1, Articles 100-110.79, Definitions

3.3 2017 *NEC* Chapter 2, Articles 210-285.25 (Plan)

3.4 2017 *NEC* Chapter 3, Articles 300-358 (Build)

3.5 2017 *NEC* Chapter 6 and 7 Article 625, 702, 705, and 706

3.6 NECA 413-2012 Standards for EVSE Installation

3.0 – 2017 NEC Review
Module Learning Objectives

Upon completion of this module, students should be able to…

- Recognize, locate, and apply various *National Electrical Code (NEC)* requirements in Article 90, Chapters 1 - 4, Article 625, 702, 705, 706, and NECA 413 as they apply to an Electric Vehicle (EV) charging equipment installation.
- Identify and apply the *NEC* calculations. The student should be able to perform a standard load calculation for a branch circuit, feeder or service.
- Identify specific *NEC* requirements from Article 625 as they apply to EVSE installations.

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Module 3 – Section 3.1
Article 90

3.1 – 2017 NEC Article 90 Overview

Section 3.1 – Is an introduction to Article 90 of the 2017 NEC*. Article 90 defines the purpose, scope, and layout of the* Code*. This section serves as a review of Article 90.*

3.1 – 2017 NEC Article 90
Learning Objectives

Upon completion of this section, students should be able to…

- Explain the purpose and scope of the *National Electrical Code (NEC)* (90.1, 90.2).
- Describe the difference between generally applicable requirements and requirements that are supplemented or modified by other articles (90.3).
- Demonstrate awareness of the layout of the *NEC*.

3.1 – 2017 NEC Article 90

90.1 Purpose of the *Code*

(A) Practical Safeguarding

The purpose of this Code is the practical safeguarding of persons and property from hazards arising from the use of electricity.

(B) Adequacy

(C) Relation to Other International Standards

90.2 Scope of the Code

(A) Covered

(B) Not Covered

(C) Special Permission

3.1 – 2017 NEC Article 90

90.3 Arrangement of the Code:
The Code is divided into introduction and nine chapters as follows:

- Chapters 1, 2, 3, and 4 apply generally.
- Chapters 5, 6, and 7 apply to special occupancies, special equipment, or other special conditions and may supplement or modify the requirements in Chapters 1 through 7.
- Chapter 8 covers communications systems and is not subject to the requirements of Chapters 1 through 7 except where the requirements are specifically referenced in Chapter 8.
- Chapter 9 consists of tables that are applicable as referenced.

90.5 Mandatory rules, permissive rules, and explanatory material:

(A) Mandatory Rules

(B) Permissive Rules

(C) Explanatory Material

(D) Informative Annexes

3.1 – 2017 NEC Article 90
Questions?

Review: Introduction, Definitions, General, Plan, Build, Use, Once, Every, Century, Communication, and Tables.

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Module 3 – Section 3.2
Definitions & Applications

3.2 NEC Chapter 1: Definitions & General Application Overview

Section 3.2 - Chapter 1, the *Code* articles and definitions that apply generally to electrical installations. While EVSE installations have many electrical attributes that are unique to EVSE, the installations have many attributes that are not modified but are supported by Article 625.

3.2 NEC Chapter 1 Definitions & General Application Learning Objectives

Upon completion of this section, students should be able to…

- Recognize and locate various applicable *Code* definitions.
- Locate and apply various subsections of Article 110.
- Demonstrate understanding of the application of *NEC* 110.14(C).

3.2 NEC Chapter 1 Definitions & General Application Article 100

- Scope
- Accessible, Readily
- Ampacity
- Attachment Plug
- Authority Having Jurisdiction
- Bonded
- Bonding Conductor or Jumper
- Bonding Jumper, Equipment

3.2 NEC Chapter 1 Definitions & General Application Article 100

- Branch Circuit
- Continuous Load
- Demand Factor
- Disconnecting Means
- Feeder
- Ground, Grounded, EGC, GEC

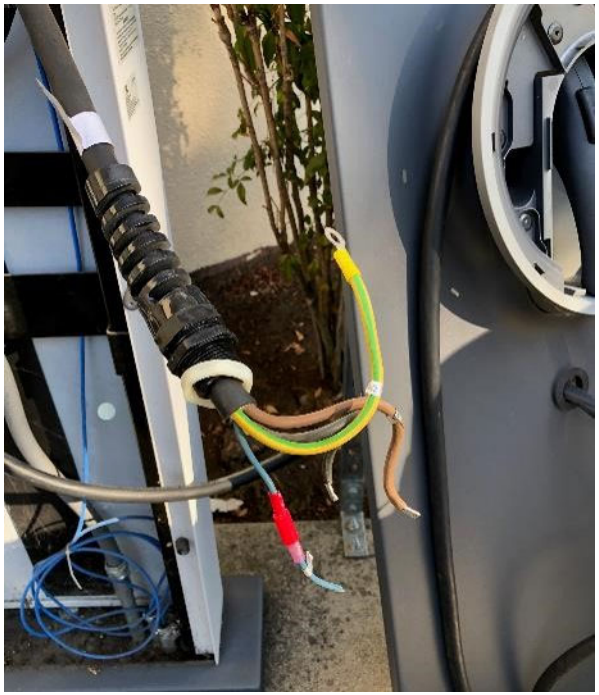
3.2 NEC Chapter 1 Definitions & General Application Article 110

Requirements in Article 110 apply to all electrical installations including:

- Examination and approval
- Installation and use
- Access to and spaces about electrical conductors and equipment
- Equipment must be identified for the use and installed according to the listing requirements
- Completed installations must have integrity of wiring
- Circuit protective equipment must have sufficient interrupting ratings

- 110.1 Scope
- 110.3 Examination, installation, use
- 110.12 Neat and workmanlike manner
- 110.13 Mounting Electrical Equipment

3.2 NEC Chapter 1 Definitions & General Application Article 110



110.14 Electrical Connections A,B,C(1)(a, b)

Requirements in Article 110 apply to all electrical installations including:

- Conductors and equipment must be identified for use in the operating environment
- Equipment shall be installed in a neat and workmanlike manner
- Equipment shall be mounted securely
- Electrical connections shall be designed for the material of the conductor
- Temperature ratings associated with the ampacity of a conductor

3.2 NEC Chapter 1 Definitions & General Application Article 110

- 110.16 Arc-Flash Hazard Warning
- 110.21 Markings
- 110.22 ID of Disconnecting Means

Requirements in Article 110 apply to all electrical installations including:

- Arc-flash hazard warnings must be placed on equipment
- Parts of equipment that produce arcs must be enclosed
- Manufacturer's information must be placed on all electrical equipment
- Each disconnecting means shall be marked as to its purpose

3.2 NEC Chapter 1 Definitions & General Application Article 110

110.25 Lockable Open Disconnecting Means

110.26 Spaces about Electrical Equipment (A-F) see (F)

110.27 Guarded Against Accidental Contact

110.28 Enclosure Types

Requirements in Article 110 apply to all electrical installations including:

- Adequate space shall be provided around electrical equipment
- Live parts shall be guarded against accidental contact
- Enclosures shall be marked with an enclosure-type number

3.2 NEC Chapter 1 Definitions & General Application Article 110 - Questions?

What definitions relate to EVSE?
How should an electrician determine which insulation temperature/ampacity column to use in table 310.15 B.16.?

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Module 3 – Section 3.3
NEC Review

Section 3.3 NEC Chapter 2 Overview

Section 3.3 – Chapter 2 covers wiring and protection. This section covers articles involved in the PLAN phase of any electrical installation, including EVSE. The planning phase of an EVSE installation is critical to ensure a successful EVSE installation. If the planning phase is overlooked, the potential for nuisance tripping of the service main OCPD and the potential for fire damage, is increased dramatically. Everything we build begins with a plan. This section will help prepare you for exercises in module 4, load calculations.

Section 3.3 NEC Chapter 2 Learning Objectives

Upon completion of this section, students should be able to…

- Locate and apply Articles 210, 215, 220, 225, 240, and especially Article 250.
- Identify the various loads, tables, and calculations used to determine branch-circuit, feeder, and service load calculation per Article 220.
- Demonstrate understanding of the application of multiple articles in Chapter 2 (210, 215, especially 220 and 250)

Section 3.3 NEC Chapter 2 Article 210

- Scope General requirements for Branch Circuits
- Article 100 Definition: Branch Circuit
- 210.4(A)-(C) Multiwire, Disconnected Simultaneously
- 210.5 Identification for Branch Circuits

Article 100 Definition Branch Circuit:

The circuit conductors between the final overcurrent device protecting the circuit and the outlet(s).

Section 3.3 NEC Chapter 2 Article 210

- 210.5(C)(2) DC system branch circuits (mention, brief)
- 210.6 Voltage limitations
- 210.19(A) Informational Note 1,2, and 4
- 210.19(A)(1)(a) and (b) Branch Circuit rating >125% of the load

- Each conductor and its application shall be identified
- Branch circuit voltage limitations are in place based on the voltage between conductors
- Branch circuit rating shall be 125% of continuous plus non-continuous loads
- Overcurrent protection is calculated the same way
- Recommended 3% voltage drop when sizing branch circuit conductors of great lengths

Section 3.3 NEC Chapter 2 Article 210

- 210.20(A)-(D) Overcurrent Protection (highlight sends to 240.4)
- 210.21(B)(1)-(3), plus Table 210.21(B)(3) Outlet Devices/Receptacle
- 210.23(A)-(D) Permissible loads, multi-outlet branch circuits

Receptacle rating requirements include:

- Single receptacles shall be rated no less than that of the branch circuit
- When multiple receptacles are on the same circuit, the load on one receptacle is limited to 80% of circuit capacity
- Receptacle ratings in Table 210.21(B)(3) apply
- For circuits over 50 A, rating of the receptacle shall not be less than rating of the circuit

Section 3.3 NEC Chapter 2 Article 210

Branch circuit loads must be less than the branch circuit ampere rating.

- For 15A & 20A branch circuits:
- Portable cord and plug equipment shall not exceed 80% of the branch circuit rating
- Fixed-in-place cord and plug equipment shall not exceed 50% of the branch circuit rating
- For 30 A branch circuits any one cord and plug equipment can not be more than 80% of the circuit rating
- Branch circuits over 50 A shall not serve lighting loads

Section 3.3 NEC Chapter 2 Article 215

- 215.2(A)(1)(a) and (b) >125% Continuous and Non-Continuous Load
- 215.3 Overcurrent Protection

- All the general rules for feeders in Article 215 cover these installations
- Identification of feeder conductors is the same as in Article 210 for branch circuit conductors
- Overcurrent protection for feeders is in accordance with Article 240

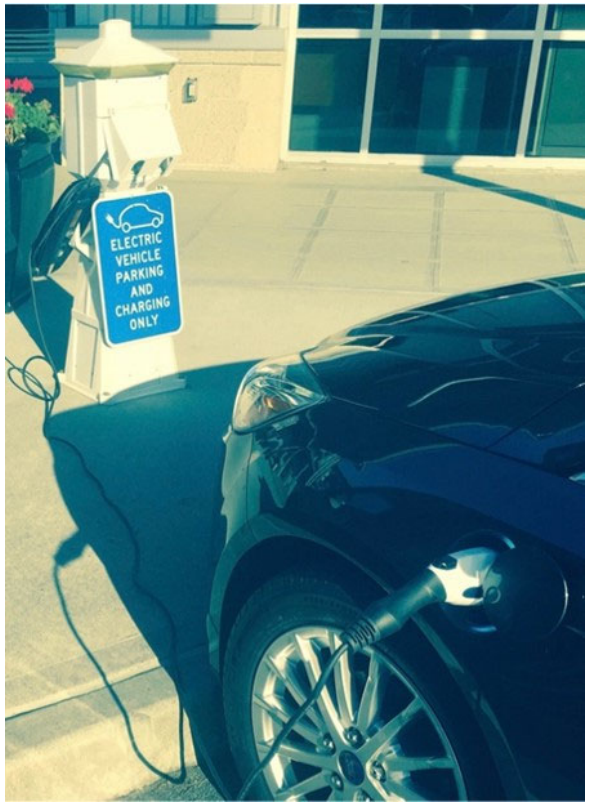
Section 3.3 NEC Chapter 2 Article 220

220.1 Scope

- Outlets for a specific appliance are calculated based on the ampere rating of the appliance
- Dwelling unit general purpose outlets are included in the lighting load
- Other non-dwelling unit receptacle outlets are calculated not less than 180 volt-amperes/yoke

Section 3.3 NEC Chapter 2 Article 220

- 220.12 General Lighting Loads by occupancy
- 220.14(A)-(L) other loads



Section 3.3 NEC Chapter 2 Article 220

- 220.40 General Feeder and Service Load Calculations
- 220.42 General Lighting
- 220.43 Show Window and Track Lighting
- 220.44 Receptacle loads

Section 3.3 NEC Chapter 2 Article 220

220.50 Motors
220.51 Space Heaters
220.56 Kitchen Equipment plus Table 220.56
220.60 Noncoincident Loads
220.61 Neutral Load Calculation

Section 3.3 NEC Chapter 2 Article 225 & 230

- 225.1 Scope
- 225.3 Table
- 225.18, 225.19 Overhead Clearances
- 230.1 Scope

- Requirements for branch circuits parallel those in Article 210
- Requirements for feeders parallel those in Article 215
- Additional requirements exist in 225.18 & 225.19 for overhead clearances

Section 3.3 NEC Chapter 2 Article 240

- 240.1 Scope
- 240.4(A)-(G) Protection of Conductors

240.4(D) limits the OCPD sizes to be used on smaller branch circuit conductors:

- 14 AWG wire protected at 15A
- 12 AWG wire protected at 20A
- 10 AWG wire protected at 30A

Section 3.3 NEC Chapter 2 Article 240

- 240.5(A) Protection of Flexible Cords, Ampacities
- 240.6 Standard Size Fuse and Breaker
- 240.21 OCPD Location

OCPD shall:

- be located at the point where conductors receive their supply
- be readily accessible
- be protected from physical damage
- have the proper enclosure for the environment

Section 3.3 NEC Chapter 2 Article 240

- 240.24 Readily Accessible Switches
- 240.30 OCPD Protection from Damage
- 240.32 OCPD Suitable for Installation

Section 3.3 NEC Chapter 2 Article 250

- 250.1 Scope
- 250.4(A)(1)-(5) Electrical System Grounding

Grounding of electrical systems is intended to:

- Provide a connection to earth to limit and stabilize voltages and line surges
- Limit voltage imposed by unintentional contact with higher-voltage lines
- Limit voltage imposed by lightning surges

Section 3.3 NEC Chapter 2 Article 250

- 250.4(A)(5) Effective Ground Fault Path
- 250.8 Connection of Grounding and Bonding Equipment
- 250.66 GEC Sizing

- EGCs, GECs, and bonding jumpers shall be connected by one of the methods permitted in 250.8
- These connections must not be subject to physical damage

Section 3.3 *NEC* Chapter 2 Article 250

- 250.4(A)(5) Effective Ground Fault Path
- 250.8 Connection of Grounding and Bonding Equipment
- 250.66 GEC Sizing

- EGCs, GECs, and bonding jumpers shall be connected by one of the methods permitted in 250.8
- These connections must not be subject to physical damage

Size of Largest Ungrounded Service Entrance or Equivalent Area for Parallel Conductors	Size of GEC
Copper	**Copper**
2 or smaller	8
1 or 1/0	6
2/0 or 3/0	4
Over 3/0 through 350	2
Over 350 through 600	1/0
Over 600 through 1100	2/0
Over 1100	3/0

Section 3.3 NEC Chapter 2 Article 250

- 250.96 Bonding other Enclosures
- 250.97 Bonding over 250V to Ground
- 250.118 EGC Types

- All metal components intended to serve as the equipment grounding path shall be bonded together
- Special requirements exist for bonding metallic equipment used in circuits rated over 250 volts

Section 3.3 NEC Chapter 2 Article 250

- 250.119 I.D. EGC
- 250.122 EGC Sizing
- 250.126 ID of Wiring Device
- 250.148 Continuity and Attachment of EGC

Load Side equipment bonding jumpers:

- Sized per Table 250.122 based on the size OCPD
- May be installed inside or outside the raceway
- Shall not be subject to physical damage

Section 3.3 NEC Chapter 2 Article 250

- 250.119 I.D. EGC
- 250.122 EGC Sizing
- 250.126 ID of Wiring Device
- 250.148 Continuity and Attachment of EGC

Load Side equipment bonding jumpers:

- Sized per Table 250.122 based on the size OCPD
- May be installed inside or outside the raceway
- Shall not be subject to physical damage

Rating or Setting of OCP Ahead of Equipment	Size of Copper EGC
15	14
20	12
60	10
100	8
200	6
300	4
400	3

Section 3.3 NEC Chapter 2 Questions?

- If all the articles covered are important, how do you know which ones you will be referencing most often?
- If you are preparing to add EVSE to an existing location, what would you need to do first? Load calculations for both.

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Module 3 – Section 3.4
NEC Review

Section 3.4 NEC Chapter 3 Overview

Chapter 3 covers wiring methods and materials. It is crucial to the safety of the EVSE user and the EVSE equipment to have the proper materials used for the EVSE installation. This section will review conductors, conductor ampacities, insulation types, raceway types, enclosure types and other materials used to BUILD the EVSE installation. This section will allow the students and the instructor to explore the various contributing factors of an EVSE installation.

Section 3.4 NEC Chapter 3
Learning objectives

Upon completion of this section, students should be able to…

- Apply the requirements of Chapter 3 as they relate to conductor ampacity.
- Identify compliance or violation of Chapter 3 requirements by material use and application.
- Explain the use/application of 110.14(C), 310.104(A), and 310.15(B)(16) table columns, 310.15(B)(2)(A) and (B)(3)(A)

Section 3.4 NEC Chapter 3 Article 300

- 300.1 Scope Wiring Methods and Materials
- 300.2 Temperature Limitations of Conductors
- 300.3(B)(1)-(4), (C)(1) Conductors
- 300.4 Protection from Physical Damage
- 300.5 Underground Installations (Table)(Critical for EVSE Installations)
- 300.11 Securing and Supporting
- 300.12 Mechanical and Electrical Continuity of Conductors
- 300.14 Length of Free Conductor at J-Box
- 300.17 Number and Size of Conductors in a Raceway
- 300.21 Spread of Fire

Article 300 covers requirements for the following:

- Protection against physical damage
- Underground Installations
- Mechanical and electrical continuity of conductors
- Number and size of conductors in raceways
- Spread of fire or products of combustion

Section 3.4 NEC Chapter 3 Article 310

- 310.1 Scope Conductors for General Wiring
- 310.10(A)-(H) Uses Permitted (references 310.104(A), (B)(Critical)
- 310.15(A)(1)-(3) Ampacities for Conductors Rated 0-2,000 Volts
- 310.15(B) Ampacity Tables
- 310.15(B)(1) Again references 310.104 A.
- 310.15(B)(2)(a) Table Ambient Temperature Correction Factors (Critical)
- 310.15(B)(3)(a) Table Adjustment Factors (Critical)
- 310.15(B)(5) Neutral Conductor
- 310.15(B)(6) Grounding or Bonding Conductor
- 310.15(B)(7)(4) Last Statement recently added
- 310.15(B)(16) Table Allowable Ampacities (Critical, review column use)

Article 310 covers requirements for the following:

- Conductor material
- Minimum size conductors
- Locations for conductors
- Marking of conductors and cables
- Conductor identification
- Conductor constructions and applications

Section 3.4 NEC Chapter 3 Article 314

- 314.1 Scope Outlet, Device, Pull, J-Box, Conduit Bodies etc.
- 314.4 Metal Boxes
- 314.15 Damp or Wet Locations
- 314.16(A) and (B) Number of Conductors in J-Box etc. (Critical)
- 314.16(B) Table
- 314.17 Conductors entering Boxes
- 314.23(A)-(H) Supports
- 314.24 Depth of Boxes
- 314.25 Covers and Canopies
- 314.27 Outlet Boxes

Article 314 covers requirements for the following:

- Sizing and grounding of metal boxes
- Number of conductors in outlet, device and conduit bodies
- Conductors entering boxes, and conduit bodies
- Box supports
- Minimum depth of boxes for outlets, devices and utilization equipment
- Outlet boxes

Section 3.4 NEC Chapter 3 Articles 320 -358

Raceway and Cable Articles:

- 320 – Armored cable
- 330 – Metal-clad cable
- 338 – Service entrance cable
- 342 – Type IMC
- 344 – Type RMC
- 348 – Type FMC
- 350 – Type LFMC
- 352 – Type PVC
- 356 – Type LFNC
- 358 – Type EMT

Section 3.4 NEC Chapter 3 Questions?

- Why is Article 110.14(C) mentioned in this section?
- What is the significance of 310.104(A)?
- What is the general purpose of 310.15(B)(2)(A) and (B)(3)(A)?

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Module 3 – Section 3.5
NEC Chapters 6 & 7

Section 3.5 NEC Chapters 6 & 7 Overview

In Section 3.5, Article 625, 702, and 705 will be reviewed. Article 625, Electric Vehicle Charging Systems, covers definitions and specific code requirements for EVSE. Article 702 and 705 provide the opportunity for the students and the instructor to discuss EVs and other storage systems as Optional Standby Systems and Interconnected Electric Power Production Sources. An EVSE is a piece of Special Equipment and therefore falls under Chapter 6. Specific code requirements for EVSE that modify Chapters 1 - 3 will be found in Article 625.

Section 3.5 NEC Chapters 6 & 7 Learning Objectives

Upon completion of this section, students should be able to…

- Identify and utilize proper terminology in 625 as it relates to EV charging equipment.
- Identify specific *Code* requirements for EV charging equipment and installations.
- Identify *Code* requirements which lend themselves to the intrinsic safety of the EV charging equipment.
- Identify requirements for Optional Standby Systems and Interconnected Electric Power Production Sources described in Articles 702 and 705.

Section 3.5 NEC Chapters 6 & 7
Article 625

- 625.1 Scope Electric Vehicle Charging System
- 625.2 Definitions (critical: cover new definitions)
- 625.10(A)-(D) EV Coupler
- 625.15 Markings
- 625.17(A)-(B) Cords and Cables (critical to distinguish)
- 625.18 Interlock
- 625.19 Automatic De-energization of cable (Critical)
- 625.22 Personnel Protection System
- 625.40 Electric Vehicle Branch Circuit
- 625.41 Overcurrent Protection
- 625.42 Rating
- 625.43 Disconnecting Means
- 625.44(A)-(C) Equipment Connection
- 625.48 Interactive Systems (critical to introduce 702, 705)
- 625.50 Location
- 625.54 GFCI

Section 3.5 NEC Chapters 6 & 7
Article 625.1 Scope

- 625.1 covers “the electrical conductors and equipment external to an electric vehicle that connect an electric vehicle to a supply of electricity by conductive, inductive, or wireless power transfer (contactless inductive charging) means, and the installation of equipment and devices related to electric vehicle charging.”

Section 3.5 NEC Chapters 6 & 7
Article 625.1 Definitions

- Cable Management System
- **Charger Power Converter**
- Electric Vehicle
- Electric Vehicle Connector
- Electric Vehicle Coupler
- Electric Vehicle Inlet
- Electric Vehicle Storage Battery
- Electric Vehicle Supply Equipment
- **Fastened in Place**
- **Fixed in Place**
- Output Cable to the Electric Vehicle
- **Output Cable to the Primary Pad**
- Personnel Protection System
- Plug-In Hybrid Electric Vehicle (PHEV)
- **Portable (as applied to EVSE)**
- Power-Supply Cord
- **Primary Pad**
- Rechargeable Energy Storage System
- **Wireless Power Transfer (WPT)**
- **Wireless Power Transfer Equipment (WPTE)**

Section 3.5 NEC Chapters 6 & 7
Article 625.17 Cords and Cables

Power-Supply Cord:

- Type Specified in 625.17(B)(1) or as listed in 625.17(A)(1)
- Overall length shall not be more than 12” or 6’ depending upon specified conditions

Output Cable:

- Shall be Type EV, EVJ, EVE, EVJE, EVT, or EVJT
- Overall Cord length is generally limited to 25’

Section 3.5 NEC Chapters 6 & 7
Article 625.18 Interlock & 625.19 Automatic De-Energization of Cable

- An interlock is required which deenergizes the electric vehicle connector and cable when uncoupled from the vehicle.
- The cable-connector combination must automatically become deenergized upon exposure to strain.

Section 3.5 NEC Chapters 6 & 7
Article 625.22 Personal Protection System

- The EV supply equipment shall have a listed personnel protection system.
- If cord and plug equipment is used, the protective system must be part of the attachment plug or located in a power supply cable not more than 12” from the attachment plug.

Section 3.5 NEC Chapters 6 & 7
Article 625.40 Electric Vehicle Branch Circuit & 625.41 Overcurrent Protection.

- Overcurrent protection for feeders and branch circuits supplying electrical vehicle equipment shall be sized based on a **continuous** duty rating.
- The rating of the OPCD shall be 125% of the continuous load plus the non-continuous load(s).
- Where an automatic load management system is used, load is based on the maximum permitted by the load management system.

Section 3.5 NEC Chapters 6 & 7
Article 625.42 Rating

- Electric vehicle charging loads shall be considered to be continuous loads for the purposes of this article.

Section 3.5 NEC Chapters 6 & 7
Article 625.43 Disconnecting Means.

Disconnecting means for EV supply equipment rated 60 amperes or more, or more than 150 volts to ground:

- Shall be in a readily accessible location
- Shall be lockable in accordance with 110.25

Section 3.5 NEC Chapters 6 & 7
Article 625.44 Equipment Connection

625.44 describes how equipment shall be connected to the premises wiring system based on the following types of equipment:

(A) Portable Equipment

(B) Stationary Equipment

(C) Fixed Equipment

Section 3.5 NEC Chapters 6 & 7

Article 625.46 Loss of Primary Source & 625.47 Multiple Feeder or Branch Circuits & 625.48 Interactive Systems.

- Upon loss of utility power, a means to prevent back-feed through the EV or the supply equipment shall be provided (unless interactive system).
- More than one feeder or branch circuit is allowed to supply equipment identified for the purpose.
- Electric vehicle supply equipment can be interconnected to a vehicle to serve as an interactive system for use as a power production source, bi-directional power feed, or optional standby system.

Section 3.5 NEC Chapters 6 & 7
Article 625.50 Location

EV Supply equipment shall be:

- Located for direct connection to the vehicle
- Unless listed and marked for the location, the coupling shall be stored not less than 18” AFF for indoors and not less than 24” above grade level for outdoor locations (does not apply to portable EVSE).

Section 3.5 NEC Chapters 6 & 7
Article 702

- 702.1 Optional Standby Systems
- 702.2 Definition
- 702.4 Capacity and Rating
- 702.5 Transfer Equipment
- 702.7 Signs
- 702.10 Wiring
- 702.11 Separately Derived System
- 702.12 Outdoor Generator Sets

Section 3.5 NEC Chapters 6 & 7
Article 706

- 705.1 Scope Interconnected Electric Power Production
- 705.2 Definitions
- 705.3 Table 706.1 Scope Energy Storage Systems
- 706.2 Definitions
- 706.8 Connection to other Energy Sources
- 706.10(A)-(E) ESS Locations
- 706.20 Circuit Sizing and Current
- 706.21 OCPD
- 706.30 Installation of Batteries

Section 3.5 NEC Chapters 6 & 7 Questions?

- What are the minimum mounting height requirements for the coupling means for EVSE?
- Are EVSE branch circuits required to be dedicated?
- Why would this section cover Optional Standby Systems and Energy Storage Systems, I thought we were just plugging in cars?
- Where does this energy storage model lead us in the next decade or two?

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Module 3 – Section 3.6
NECA 413 – 2012 Standards

Section 3.6 NECA 413-2012 Standards for EVSE Installation Overview

Section 3.6 reviews NECA 413-2012 Standards for EVSE Installation, which covers installation and maintenance procedures for AC Level 1 & 2 and DC fast charge EVSE. National Electrical Installation Standards (NEIS) developed the 413 standard to improve communication among specifiers, purchasers, and suppliers of electrical construction services. This section will provide time for the students and the instructor to discuss what codes, standards, and programs such as EVITP are based on.

Section 3.6 NECA 413-2012 Standards for EVSE Installation Learning Objectives

Upon completion of this section, students should be able to…

- Identify and apply the standards for EVSE installations.
- Distinguish between AC Level 1, Level 2, and DC fast charge system wiring and characteristics.
- Identify the pin configuration for the SAE J1772.
- Identify requirements which adhere to ADA compliance.

Section 3.6 NECA 413-2012 Standards for EVSE Installation NECA 413-2012

- Foreword
- 1. Scope
- 1.2 Excluded
- 2. Definitions
- 3. Overview
- 4. Safety
- 5. Pre-Installation Considerations
- 6. Installation Requirements
- 6.2 Startup and Commissioning
- 7. Maintenance
- Annex A. Installer and Inspector Guidelines

Section 3.6 NECA 413-2012 Standards for EVSE Installation NECA 413-2012

- EVSE market presents opportunities for qualified electrical contractors.
- The goal of NECA is to assist in the safe, sound and successful growth of the electric vehicle market.
- NECA is a principal contributor to the EVITP training program.

Section 3.6 NECA 413-2012 Standards for EVSE Installation NECA 413-2012

- NECA 413 is the only ANSI-approved standard for installing and maintaining Electric Vehicle Supply Equipment (EVSE).
- A performance-based standard describes procedures for installing and maintaining Level 1, Level 2, and DC Fast Charge electric vehicle supply equipment (EVSE).

Section 3.6 NECA 413-2012 Standards for EVSE Installation NECA 413-2012

The document contains:

- Scope and Definitions
- Overview
- Product Regulation, Codes and Standards
- Safety Considerations
- Pre-Installation Considerations
- Installation requirements
- Maintenance and Commissioning
- Installer and Inspector Guidelines

Section 3.6 NECA 413-2012 Standards for EVSE Installation NECA 413-2012

- Includes quality and performance aspects of installing electric vehicle charging systems and equipment.
- Addresses performing site assessments, installation management services, quality and performance issues, installer and inspector guidelines and checklists.

Section 3.6 NECA 413-2012 Standards for EVSE Installation
NECA 413-2012

- NECA 413 provides current and accurate information about electric EVSE technology and related standards.
- Fast-charging equipment technology and product standards currently in development.

Section 3.6 NECA 413-2012 Standards for EVSE Installation Questions?

- What is a distinguishing factor between AC Level 1 and AC Level 2 EVSE?
- What is the first pin to make and the last pin to break on the J1772?
- The areas of the code regarding EVSE and Energy Storage are expanding, this is typical of technology that is failing to gain acceptance or is invalid/useless, correct?