Code-Making Panel 12

Public Input Report (A19)

Public Input No. 1073-NFPA 70-2017 [Global Input]

Change all written percentages to numerical percentages.

Statement of Problem and Substantiation for Public Input

To standardize how percentages are represented in the NEC

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1071-NFPA 70-2017 [Section No. 690.8(B)(1)]	
Public Input No. 1070-NFPA 70-2017 [Section No. 690.8(B)(1)]	

Submitter Information Verification

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Submittal Date: Sat Jun 24 16:11:26 EDT 2017

Public Input No. 172-NFPA 70-2017 [Global Input]

Revise the edition of NFPA 90A to 2018 throughout the NEC.

Statement of Problem and Substantiation for Public Input

The 2018 edition of NFPA 90A is scheduled to be issued on August 10, 2017.

Submitter Information Verification

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Public Input No. 3453-NFPA 70-2017 [Global Input]

Remove the phrase “the provisions of” throughout the entire NEC and editorial revise each segment of text as required.

Statement of Problem and Substantiation for Public Input

The phrase is unnecessary and redundant. This global public input seeks to request that each NEC Panel (technical committee) review the articles under their responsibility and remove this phrase and reword the text accordingly. The requirements are already provided in the NEC so it does not make sense to refer to provisions. In many cases the phrase should refer to a section, then state that section in accordance with the NEC Style Manual requirements.

Substantiation Examples:

90.6 Formal Interpretations. To promote uniformity of interpretation and application of the provisions of this Code, formal interpretation procedures have been established and are found
in the NFPA Regulations Governing Committee Projects.

110.3(A)Examination, Identification, Installation, Use, and Listing (Product Certification) of Equipment.
(1) Suitability for installation and use in conformity with the provisions of this Code

110.30 General. Conductors and equipment used on circuits over 1000 volts, nominal, shall comply with Part I of this article and with 110.30 through 110.41 , which supplement or modify
Part I. In no case shall the provisions of this part apply to equipment on the supply side of the service point.

110.51 General.

(A)Covered. The provisions of this p Part IV shall apply to the installation and use of high-voltage power distribution and utilization equipment that is portable, mobile, or both, such as substations, trailers, cars, mobile shovels, draglines, hoists, drills, dredges, compressors, pumps, conveyors, underground excavators, and the like.

210.13 Ground-Fault Protection of Equipment. Each branch circuit disconnect rated 1000 A or more and installed on solidly grounded wye electrical systems of more than 150 volts to ground, but not exceeding 600 volts phase-to-phase, shall be provided with ground-fault protection of equipment in accordance with the provisions of 230.95.

Exception No. 1: The provisions of this This section shall not apply to a disconnecting means for a continuous industrial process where a nonorderly shutdown will introduce additional or increased hazards.
Exception No. 2: The provisions of this This section shall not apply if ground-fault protection of equipment is provided on the supply side of the branch circuit and on the load side of any transformer supplying the branch circuit.

Section 210.60(B)

(B) Receptacle Placement. In applying the provisions of 210.52(A), the total number of receptacle outlets shall not be less than the minimum number that would comply with the
provisions of that section. These receptacle outlets shall be permitted to be located conveniently for permanent furniture layout. At least two receptacle outlets shall be readily accessible. Where receptacles are installed behind the bed, the receptacle shall be located to prevent the bed from contacting any attachment plug that may be installed or the receptacle shall be provided with a suitable guard.

Submitter Information Verification

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Submittal Date: Wed Sep 06 10:12:45 EDT 2017

Copyright Assignment

I, Agnieszka Golriz, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am Agnieszka Golriz, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Input No. 4317-NFPA 70-2017 [Global Input]

Each code making panel should set time aside to review the requirements under their purview to ensure that new and existing requirements are in compliance with the NEC style manual.

Statement of Problem and Substantiation for Public Input

Code making panels are responsible for ensuring that the Code text which agreed upon at the technical panel meetings comply with all requirements of the NEC style manual. It would be prudent for each code making panel to set time aside to review the requirements under their purview to ensure that not only new but existing requirements are in compliance with the requirements of the NEC style manual.

Adherence to the NEC style manual promotes consistency throughout the NEC adding to clarity to the users of the NEC. Code making panels should spend available time reviewing for such important style manual requirements as the following: (These are just some examples and not a comprehensive list of style manual requirements.)

Unenforceable Terms. The NEC shall not contain references or requirements that are unenforceable or vague. The terms contained in Table 3.2.1 of the style manual shall be reviewed in context, and, addressed if the resulting requirement is unenforceable or vague. Examples of unenforceable and Vague Terms include the following:

designed for the purpose.
good
adequate
frequent(ly)

Writing in present text. Requirements must be written in present text and not future text. A good example of this is as follows:

Correct: No conductor shall be used in such a manner that its operating temperature exceeds that designated for the type of insulated conductor involved.
Incorrect: No conductor shall be used in such a manner that its operating temperature will exceed that designated for the type of insulated conductor involved.

Submitter Information Verification

Submitter Full Name:	Thomas Domitrovich
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Submittal Date:	Thu Sep 07 20:19:11 EDT 2017

Copyright Assignment

I, Thomas Domitrovich, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am Thomas Domitrovich, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Input No. 777-NFPA 70-2017 [Global Input]

The terms “satisfactory” - "equal" - "equivalent", etc., are examples of numerous subjective terms found in the NEC where decisions of suitability fall under the purview of the AHJ. Changing or supplementing these terms to "approved" - "approved equivalent" will continue the alignment of language used throughout the NEC.

I authored a couple of such changes for the 2014 NEC that were adopted in the 2017. It was suggested to me by someone from NFPA that I submit a global input, so a committee would be appointed to locate and revise all such subjective terms to include the word "approved".

This will reduce the number of terms used to determine suitability of equipment as it applies to installation/inspection to one of the following: "Listed" - "Identified" - "Approved"

Statement of Problem and Substantiation for Public Input

I think the language in my global proposal not only states the problem, but offers a viable solution to facilitate uniformity of language throughout the NEC.

Submitter Information Verification

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Submittal Date: Sat May 20 15:35:20 EDT 2017

Public Input No. 292-NFPA 70-2017 [Part V.]

Part V. Overcurrent Protection Relocate this to Article 240.

Statement of Problem and Substantiation for Public Input

All overcurrent protection requirements should be consolidated in Article 240 for more convenient reading and to have all overcurrent protection under one code making panel.

Submitter Information Verification

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Submittal Date: Fri Feb 24 13:03:56 EST 2017

Public Input No. 4059-NFPA 70-2017 [Part VII.]

Part VII. Grounding and Bonding

Statement of Problem and Substantiation for Public Input

The requirements in 610.61 include both equipment grounding requirements in addition to bonding requirements, thus the need for changing the title of Part VII. Section 610.61 has been divided into two separate subdivisions to separate the grounding and bonding requirements and refer to the applicable parts of Article 250 in a manner consistent with the NEC Style Manual requirements. Other editorial revisions were made for clarity and to ensure that Subdivision (A) provides the equipment grounding requirement and subdivision (B) provides the bonding requirements.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz

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Submittal Date: Thu Sep 07 13:14:24 EDT 2017

Public Input No. 723-NFPA 70-2017 [Section No. 610.1]

610.1 Scope.

This article covers the installation of electrical equipment and wiring used in connection with cranes, monorail hoists, hoists, and all runways.

Informational Note: For further information, see ASME B30**.21-2014** ,*Safety ~~Standards~~ Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings*.

Statement of Problem and Substantiation for Public Input

Referenced correct standard number and edition year.

Submitter Information Verification

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Submittal Date: Sun May 14 22:40:07 EDT 2017

Public Input No. 1912-NFPA 70-2017 [Section No. 610.2]

610.2 Definition. The definitions in this section shall apply only within this article.

Festoon Cable.

Single- and multiple-conductor cable intended for use and installation in accordance with Article 610 where flexibility is required.

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of task group appointed by the NEC Correlating Committee. This task group was appointed to identify potential issues in the NEC with respect to how definitions in both Article 100 and the XXX.2 sections of this Code apply. The member of the task group are: David Hittinger, Rich Holub, Chris Hunter, Dave Williams, Chris Porter, Alan Manche, Ken Boyce, John Kovacik, Donny Cook, Dave Kendall and Jim Dollard.

Section 2.2.2.1 of the NEC Style Manual requires that in general definitions that appear in two or more articles be located in Article 100. Section 2.2.2.2 requires that where an individual article contains definition(s), they be located in the second section (XXX.2) of the article. It is extremely important to note that the style manual does not prohibit a definition in the second section of an article from applying elsewhere in the NEC. The style manual clearly states that in general definitions that appear in two or more articles shall be located in Article 100. This has confused many code users in the past. This style manual requirement is accurate and these public inputs are simply an attempt to provide needed clarity. See the example below:

344.2 Definition.
Rigid Metal Conduit (RMC). A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.

The definition of the term “rigid metal conduit” is appropriately located in the article that contains general, installation and construction specifications for this raceway. It is commonly understood that the term “rigid metal conduit” is used in more than one article. There are many articles that contain a single definition that is necessary for application of the contained requirements but will apply elsewhere in the NEC. This occurs in articles that address cable assemblies, raceways, systems and more.
This public input seeks to delete the last sentence in the first paragraph, as it is unnecessary. A new sentence is proposed to simply inform the user of the code that definitions are also found in the second section (XXX.2) of other articles.
This public input is supplemented with proposed revisions to the second section (XXX.2) of articles that contain definitions. New parent text is proposed for these sections to increase clarity and usability. There are two different scenarios that will be addressed. First, any second section (XXX.2) that contains definitions that apply only within that article will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply only within this article.

Second, any second section (XXX.2) that contains definitions that apply within the individual article and throughout the code will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply within this article and throughout the code.

In a few cases, in the second section (XXX.2) of an Article there are definitions that will apply only in that Article and some that will apply in that Article and throughout the code. New parent text and first level subdivisions are proposed to achieve clarity and usability The combination of these proposed revisions will provide necessary clarity and usability with respect to application of definitions. These actions will also achieve compliance with the NEC Style Manual.

Related Public Inputs for This Document

Related Input	Relationship

Public Input No. 1202-NFPA 70-2017 [Article 100 [Excluding any Sub-Sections]]

Submitter Information Verification

Submitter Full Name: James Dollard
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Submittal Date: Tue Aug 08 13:10:56 EDT 2017

Public Input No. 2414-NFPA 70-2017 [Section No. 610.11 [Excluding any Sub-Sections]]

Conductors shall be enclosed in raceways or be Type AC cable with insulated equipment grounding conductor, Type MC cable, or Type MI cable unless otherwise permitted or required in 610.11(A) through (E).

Statement of Problem and Substantiation for Public Input

Grounding and bonding still continues to be one of the most misunderstood and misapplied sections of the NEC. Most of the problems can be traced back to using undefined terminology (trade slang in many cases) or incorrect terminology. The term "grounding conductor" is one that is no longer defined. As part of a Correlating Committee Task Force activity on grounding and bonding in general, this term and its related definition was removed from the NEC during the 2008 NEC cycle. The term had been found to be misapplied in a number of instances and the definition of "grounding conductor" was determined to be very close to the definition of "grounding electrode conductor" yet, many uses of the term in previous editions of the NEC were found to be more correctly to be either "equipment grounding conductor", "grounding electrode conductor" or one of the several types of "bonding jumper".

The revised text uses terms defined in the Code and is consistent with the context of the meaning of the section where the revisions are made. The revisions are made to provide clarity, and consistency in terminology usage.

It is requested the Correlating Committee consider a policy or procedures that require a review when a term under the responsibility of a specific Code panel is used by another Code panel. The panel responsible for the term is to review the application to ensure correct usage. It is further requested that when new terms are created that would be identified as under the responsibility of another Code panel that the new term and application be reviewed by the Code panel that would have responsibility for use and application.

Submitter Information Verification

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Submittal Date: Thu Aug 17 19:01:46 EDT 2017

Public Input No. 2516-NFPA 70-2017 [Section No. 610.61]

610.61 Grounding.

All exposed non–current-carrying metal parts of cranes, monorail hoists, hoists, and accessories, including pendant controls, shall be bonded either by mechanical connections or bonding jumpers, where applicable, so that the entire crane or hoist is ~~a~~ an effective ground-fault current path as required or permitted by Article 250, Parts V and VII.

Moving parts, other than removable accessories, or attachments that have metal-to-metal bearing surfaces, shall be considered to be electrically bonded to each other through bearing surfaces for ~~grounding purposes~~ the purposes of establishing an effective ground-fault current path . The trolley frame and bridge frame shall not be considered as electrically ~~grounded~~ bonded through the bridge and trolley wheels and its respective tracks. A separate bonding conductor shall be provided.

Statement of Problem and Substantiation for Public Input

This is a companion PI to PIs that recommend the deletion of the definition 'ground-fault current path' and the modification of applicable sections in 250.118. An 'effective ground-fault current path' is defined as one that is intentionally constructed. This certainly fits the intention of 610.61

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2515-NFPA 70-2017 [Section No. 250.118]	overall effort to change all occurrences of 'ground-fault current path' to 'effective ground-fault current path'
Public Input No. 2159-NFPA 70-2017 [Definition: Ground-Fault Current Path.]	overall effort to change all occurrences of 'ground-fault current path' to 'effective ground-fault current path'

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Affilliation: Self

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Submittal Date: Sat Aug 19 19:40:31 EDT 2017

Public Input No. 4061-NFPA 70-2017 [Section No. 610.61]

610.~~61~~ 61

(A) Grounding.

All exposed non–current-carrying metal parts of cranes, monorail hoists, hoists, and accessories, including pendant controls, shall be grounded by connection to the equipment grounding conductor of the supply branch circuit or feeder and shall meet the applicable requirements in Parts I, VI, and VII of Article 250.

(B) Bonding. All exposed non–current-carrying metal parts of cranes, monorail hoists, hoists, and accessories, including pendant controls, shall be bonded either by ~~mechanical~~ mechanical connections or bonding jumpers, where applicable, so that the entire crane or hoist is a ground-fault current path as required or permitted by Parts I and V of Article 250 ~~,~~ ~~Parts V and VII~~ .

Moving parts, other than removable accessories, or attachments that have metal-to-metal bearing surfaces, shall be considered to be electrically bonded to each other through bearing surfaces for grounding purposes. The trolley frame and bridge frame shall not be considered as electrically grounded through the bridge and trolley wheels and its respective tracks. A separate bonding conductor shall be provided.

Statement of Problem and Substantiation for Public Input

The requirements in 610.61 include both equipment grounding requirements in addition to bonding requirements, thus the need for changing the title of Part VII. Section 610.61 has been divided into two separate subdivisions to separate the grounding and bonding requirements and refer to the applicable parts of Article 250 in a manner consistent with the NEC Style Manual requirements. Other editorial revisions were made for clarity and to ensure that Subdivision (A) provides the equipment grounding requirement and subdivision (B) provides the bonding requirements.

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Submittal Date: Thu Sep 07 13:15:18 EDT 2017

Public Input No. 724-NFPA 70-2017 [Article 620]

Article 620 Elevators, Dumbwaiters, Escalators, Moving Walks, Platform Lifts, and Stairway Chairlifts

Part I. General

620.1 Scope.

This article covers the installation of electrical equipment and wiring used in connection with elevators, dumbwaiters, escalators, moving walks, platform lifts, and stairway chairlifts.

Informational Note No. 1: For further information, see ASME A17.1-~~2013~~ 201 **6** /CSA B44-13, *Safety Code for Elevators and Escalators*.

Informational Note No. 2: For further information, see CSA B44.1-~~11~~ 1 **4** /ASME-A17.5-2014, *Elevator and Escalator Electrical Equipment*.

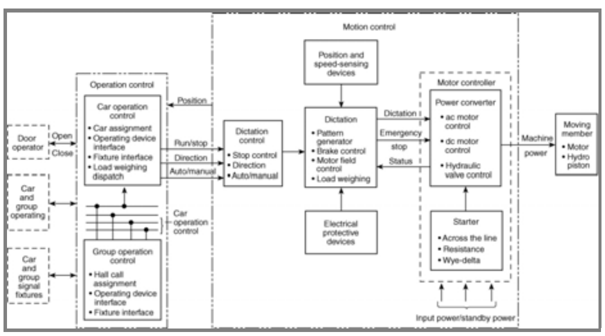
Informational Note No. 3: The term *wheelchair lift* has been changed to *platform lift*. For further information, see ASME A18.1-2014, *Safety Standard for Platform Lifts and Stairway Chairlifts*.

620.2 Definitions.

Informational Note No. 1: The motor controller, motion controller, and operation controller are located in a single enclosure or a combination of enclosures.

Informational Note No. 2: Informational Note Figure 620.2, No. 2 is for information only.

Figure Informational Note Figure 620.2, No. 2 Control System.



Control Room (for Elevator, Dumbwaiter).

An enclosed control space outside the hoistway, intended for full bodily entry, that contains the elevator motor controller. The room could also contain electrical and/or mechanical equipment used directly in connection with the elevator or dumbwaiter but not the electric driving machine or the hydraulic machine.

Control Space (for Elevator, Dumbwaiter).

A space inside or outside the hoistway, intended to be accessed with or without full bodily entry, that contains the elevator motor controller. This space could also contain electrical and/or mechanical equipment used directly in connection with the elevator or dumbwaiter but not the electrical driving machine or the hydraulic machine.

Control System.

The overall system governing the starting, stopping, direction of motion, acceleration, speed, and retardation of the moving member.

Controller, Motion.

The electrical device(s) for that part of the control system that governs the acceleration, speed, retardation, and stopping of the moving member.

Controller, Motor.

The operative units of the control system comprised of the starter device(s) and power conversion equipment used to drive an electric motor, or the pumping unit used to power hydraulic control equipment.

Controller, Operation.

The electrical device(s) for that part of the control system that initiates the starting, stopping, and direction of motion in response to a signal from an operating device.

Machine Room (for Elevator, Dumbwaiter).

An enclosed machinery space outside the hoistway, intended for full bodily entry, that contains the electrical driving machine or the hydraulic machine. The room could also contain electrical and/or mechanical equipment used directly in connection with the elevator or dumbwaiter.

Machinery Space (for Elevator, Dumbwaiter).

A space inside or outside the hoistway, intended to be accessed with or without full bodily entry, that contains elevator or dumbwaiter mechanical equipment, and could also contain electrical equipment used directly in connection with the elevator or dumbwaiter. This space could also contain the electrical driving machine or the hydraulic machine.

Operating Device.

The car switch, pushbuttons, key or toggle switch(s), or other devices used to activate the operation controller.

Remote Machine Room and Control Room (for Elevator, Dumbwaiter).

A machine room or control room that is not attached to the outside perimeter or surface of the walls, ceiling, or floor of the hoistway.

Remote Machinery Space and Control Space (for Elevator, Dumbwaiter).

A machinery space or control space that is not within the hoistway, machine room, or control room and that is not attached to the outside perimeter or surface of the walls, ceiling, or floor of the hoistway.

Signal Equipment.

Includes audible and visual equipment such as chimes, gongs, lights, and displays that convey information to the user.

620.3 Voltage Limitations.

The supply voltage shall not exceed 300 volts between conductors unless otherwise permitted in 620.3(A) through (C).

(A) Power Circuits.

Branch circuits to door operator controllers and door motors and branch circuits and feeders to motor controllers, driving machine motors, machine brakes, and motor-generator sets shall not have a circuit voltage in excess of 1000 volts. Internal voltages of power conversion equipment and functionally associated equipment, and the operating voltages of wiring interconnecting the equipment, shall be permitted to be higher, provided that all such equipment and wiring shall be listed for the higher voltages. Where the voltage exceeds 600 volts, warning labels or signs that read “DANGER — HIGH VOLTAGE” shall be attached to the equipment and shall be plainly visible. The danger sign(s) or label(s) shall comply with 110.21(B).

(B) Lighting Circuits.

Lighting circuits shall comply with the requirements of Article 410.

(C) Heating and Air-Conditioning Circuits.

Branch circuits for heating and air-conditioning equipment located on the elevator car shall not have a circuit voltage in excess of 1000 volts.

620.4 Live Parts Enclosed.

All live parts of electrical apparatus in the hoistways, at the landings, in or on the cars of elevators and dumbwaiters, in the wellways or the landings of escalators or moving walks, or in the runways and machinery spaces of platform lifts and stairway chairlifts shall be enclosed to protect against accidental contact.

Informational Note: See 110.27 for guarding of live parts (1000 volts, nominal, or less).

620.5 Working Clearances.

Working space shall be provided about controllers, disconnecting means, and other electrical equipment in accordance with 110.26(A).

Where conditions of maintenance and supervision ensure that only qualified persons examine, adjust, service, and maintain the equipment, the clearance requirements of 110.26(A) shall not be required where any of the conditions in 620.5(A) through (D) are met.

(A) Flexible Connections to Equipment.

Electrical equipment in (A)(1) through (A)(4) is provided with flexible leads to all external connections so that it can be repositioned to meet the clear working space requirements of 110.26:

(1) Controllers and disconnecting means for dumbwaiters, escalators, moving walks, platform lifts, and stairway chairlifts installed in the same space with the driving machine

(2) Controllers and disconnecting means for elevators installed in the hoistway or on the car

(3) Controllers for door operators

(4) Other electrical equipment installed in the hoistway or on the car

(B) Guards.

Live parts of the electrical equipment are suitably guarded, isolated, or insulated to reduce the likelihood of inadvertent contact with live parts operating at voltages greater than 30 volts ac rms, 42 volts ac peak, or 60 volts dc, and the equipment can be examined, adjusted, serviced, or maintained while energized without removal of this protection.

(C) Examination, Adjusting, and Servicing.

Electrical equipment is not required to be examined, adjusted, serviced, or maintained while energized.

(D) Low Voltage.

Uninsulated parts are at a voltage not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

Part II. Conditors

620.11 Insulation of Conductors.

The insulation of conductors shall comply with 620.11(A) through (D).

> Informational Note: One method of determining that the insulation of conductors is flame retardant is by testing the conductors or cables to the VW-1 (Vertical-Wire) Flame Test in ANSI/UL 1581-2011, *Reference Standard for Electrical Wires, Cables, and Flexible Cords*.

(A) Hoistway Door Interlock Wiring.

The conductors to the hoistway door interlocks from the hoistway riser shall be one of the following:

(1) Flame retardant and suitable for a temperature of not less than 200°C (392°F). Conductors shall be Type SF or equivalent.

(2) Physically protected using an approved method, such that the conductor assembly is flame retardant and suitable for a temperature of not less than 200°C (392°F).

(B) Traveling Cables.

Traveling cables used as flexible connections between the elevator or dumbwaiter car or counterweight and the raceway shall be of the types of elevator cable listed in Table 400.4 or other approved types.

(C) Other Wiring.

All conductors in raceways shall have flame-retardant insulation.

Conductors shall be Type MTW, TF, TFF, TFN, TFFN, THHN, THW, THWN, TW, XHHW, hoistway cable, or any other conductor with insulation designated as flame retardant. Shielded conductors shall be permitted if such conductors are insulated for the maximum nominal circuit voltage applied to any conductor within the cable or raceway system.

(D) Insulation.

All conductors shall have an insulation voltage rating equal to at least the maximum nominal circuit voltage applied to any conductor within the enclosure, cable, or raceway. Insulations and outer coverings that are marked for limited smoke and are so listed shall be permitted.

620.12 Minimum Size of Conductors.

The minimum size of conductors, other than conductors that form an integral part of control equipment, shall be in accordance with 620.12(A) and (B).

(A) Traveling Cables.

(1) Lighting Circuits.

For lighting circuits, 14 AWG copper, 20 AWG copper or larger conductors shall be permitted in parallel, provided the ampacity is equivalent to at least that of 14 AWG copper.

(2) Other Circuits.

For other circuits, 20 AWG copper.

(B) Other Wiring.

24 AWG copper. Smaller size listed conductors shall be permitted.

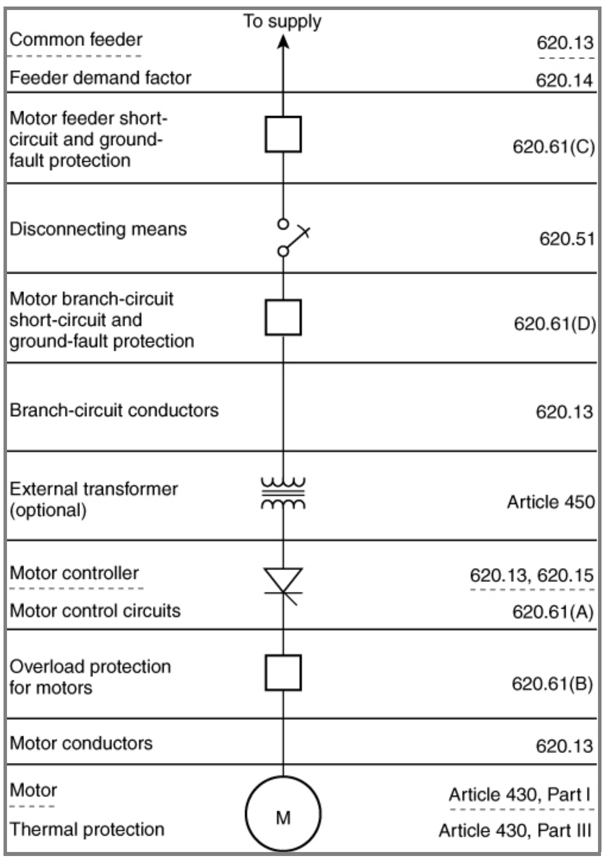
620.13 Feeder and Branch-Circuit Conductors.

Conductors shall have an ampacity in accordance with 620.13(A) through (D). With generator field control, the conductor ampacity shall be based on the nameplate current rating of the driving motor of the motor-generator set that supplies power to the elevator motor.

Informational Note No. 1: The heating of conductors depends on root-mean-square current values, which, with generator field control, are reflected by the nameplate current rating of the motor-generator driving motor rather than by the rating of the elevator motor, which represents actual but short-time and intermittent full-load current values.

Informational Note No. 2: See Informational Note, Figure 620.13, No. 2.

Figure 620.13 Informational Note Single-Line Diagram, No. 2.



(A) Conductors Supplying Single Motor.

Conductors supplying a single motor shall have an ampacity not less than the percentage of motor nameplate current determined from 430.22(A) and (E).

Informational Note: Some elevator motor currents, or those motor currents of similar function, exceed the motor nameplate value. Heating of the motor and conductors is dependent on the root-mean square (rms) current value and the length of operation time. Because this motor application is inherently intermittent duty, conductors are sized for duty cycle service as shown in Table 430.22(E).

(B) Conductors Supplying a Single Motor Controller.

Conductors supplying a single motor controller shall have an ampacity not less than the motor controller nameplate current rating, plus all other connected loads. Motor controller nameplate current ratings shall be permitted to be derived based on the rms value of the motor current using an intermittent duty cycle and other control system loads, if present.

(C) Conductors Supplying a Single Power Transformer.

Conductors supplying a single power transformer shall have an ampacity not less than the nameplate current rating of the power transformer plus all other connected loads.

Informational Note No. 1: The nameplate current rating of a power transformer supplying a motor controller reflects the nameplate current rating of the motor controller at line voltage (transformer primary).

Informational Note No. 2: See Informative Annex D, Example No. D10.

(D) Conductors Supplying More Than One Motor, Motor Controller, or Power Transformer.

Conductors supplying more than one motor, motor controller, or power transformer shall have an ampacity not less than the sum of the nameplate current ratings of the equipment plus all other connected loads. The ampere ratings of motors to be used in the summation shall be determined from Table 430.22(E), 430.24, and 430.24, Exception No. 1.

Informational Note: See Informative Annex D, Example Nos. D9 and D10.

620.14 Feeder Demand Factor.

Feeder conductors of less ampacity than required by 620.13 shall be permitted, subject to the requirements of Table 620.14.

Table 620.14 Feeder Demand Factors for Elevators

Number of Elevators on a Single Feeder	Demand Factor*
1	1.00
2	0.95
3	0.90
4	0.85
5	0.82
6	0.79
7	0.77
8	0.75
9	0.73
10 or more	0.72

* Demand factors are based on 50 percent duty cycle (i.e., half time on and half time off).

620.15 Motor Controller Rating.

The motor controller rating shall comply with 430.83. The rating shall be permitted to be less than the nominal rating of the elevator motor, when the controller inherently limits the available power to the motor and is marked as power limited.

Informational Note: For controller markings, see 430.8.

620.16 Short-Circuit Current Rating.

(A) Marking.

Where an elevator control panel is installed, it shall be marked with its short-circuit current rating, based on one of the following:

(1) Short-circuit current rating of a listed assembly

(2) Short-circuit current rating established utilizing an approved method

Informational Note: UL 508A-2013, Supplement SB, is an example of an approved method.

(B) Installation.

The elevator control panel shall not be ~~instal?led~~ installed where the available short-circuit current exceeds its short-circuit current rating, as marked in accordance with 620.16(A).

Part III. Wiring

620.21 Wiring Methods.

Conductors and optical fibers located in hoistways, in escalator and moving walk wellways, in platform lifts, stairway chairlift runways, machinery spaces, control spaces, in or on cars, in machine rooms and control rooms, not including the traveling cables connecting the car or counterweight and hoistway wiring, shall be installed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, rigid nonmetallic conduit, or wireways, or shall be Type MC, MI, or AC cable unless otherwise permitted in 620.21(A) through (C).

Exception: Cords and cables of listed cord- and plug-connected equipment shall not be required to be installed in a raceway.

(A) Elevators.

(1) Hoistways and Pits.

(a) Cables used in Class 2 power-limited circuits shall be permitted, provided the cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

(b) Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted, provided the cords and cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

(c) The following wiring methods shall be permitted in the hoistway in lengths not to exceed 1.8 m (6 ft):

(4) Flexible metal conduit

(5) Liquidtight flexible metal conduit

(6) Liquidtight flexible nonmetallic conduit

(7) Flexible cords and cables, or conductors grouped together and taped or corded, shall be permitted to be installed without a raceway. They shall be located to be protected from physical damage and shall be of a flame-retardant type and shall be part of the following:

(8) Listed equipment

(9) A driving machine, or

(10) A driving machine brake

Exception 620.21(A)(1)(c)(1), (2), and (3): The conduit length shall not be required to be limited between risers and limit switches, interlocks, operating buttons, and similar devices.

(k) A sump pump or oil recovery pump located in the pit shall be permitted to be cord connected. The cord shall be a hard usage oil-resistant type, of a length not to exceed 1.8 m (6 ft), and shall be located to be protected from physical damage.

(2) Cars.

(a) Flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit of metric designator 12 (trade size ⅜), or larger, not exceeding 1.8 m (6 ft) in length, shall be permitted on cars where so located as to be free from oil and if securely fastened in place.

Exception: Liquidtight flexible nonmetallic conduit of metric designator 12 (trade size 3⁄8), or larger, as defined by 356.2(2), shall be permitted in lengths in excess of 1.8 m (6 ft).

(b) Hard-service cords and junior hard-service cords that conform to the requirements of Article 400 (Table 400.4) shall be permitted as flexible connections between the fixed wiring on the car and devices on the car doors or gates. Hard-service cords only shall be permitted as flexible connections for the top-of-car operating device or the car-top work light. Devices or luminaires shall be grounded by means of an equipment grounding conductor run with the circuit conductors. Cables with smaller conductors and other types and thicknesses of insulation and jackets shall be permitted as flexible connections between the fixed wiring on the car and devices on the car doors or gates, if listed for this use.

(c) Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted, provided the cords and cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

(d) The following wiring methods shall be permitted on the car assembly in lengths not to exceed 1.8 m (6 ft):

(5) Flexible metal conduit

(6) Liquidtight flexible metal conduit

(7) Liquidtight flexible nonmetallic conduit

(8) Flexible cords and cables, or conductors grouped together and taped or corded, shall be permitted to be installed without a raceway. They shall be located to be protected from physical damage and shall be of a flame-retardant type and shall be part of the following:

  (9) Listed equipment

  (10) A driving machine, or

  (11) A driving machine brake

(3) Within Machine Rooms, Control Rooms, and Machinery Spaces and Control Spaces.

(a) Flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit of metric designator 12 (trade size ⅜), or larger, not exceeding 1.8 m (6 ft) in length, shall be permitted between control panels and machine motors, machine brakes, motor-generator sets, disconnecting means, and pumping unit motors and valves.

Exception: Liquidtight flexible nonmetallic conduit metric designator 12 (trade size ⅜) or larger, as defined in 356.2(2), shall be permitted to be installed in lengths in excess of 1.8 m (6 ft).

(b) Where motor-generators, machine motors, or pumping unit motors and valves are located adjacent to or underneath control equipment and are provided with extra-length terminal leads not exceeding 1.8 m (6 ft) in length, such leads shall be permitted to be extended to connect directly to controller terminal studs without regard to the carrying-capacity requirements of Articles 430 and 445. Auxiliary gutters shall be permitted in machine and control rooms between controllers, starters, and similar apparatus.

(c) Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted, provided the cords and cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

(d) On existing or listed equipment, conductors shall also be permitted to be grouped together and taped or corded without being installed in a raceway. Such cable groups shall be supported at intervals not over 900 mm (3 ft) and located so as to be protected from physical damage.

(e) Flexible cords and cables in lengths not to exceed 1.8 m (6 ft) that are of a flame-retardant type and located to be protected from physical damage shall be permitted in these rooms and spaces without being installed in a raceway. They shall be part of the following:

(6) Listed equipment

(7) A driving machine, or

(8) A driving machine brake

(4) Counterweight.

The following wiring methods shall be permitted on the counterweight assembly in lengths not to exceed 1.8 m (6 ft):

(1) Flexible metal conduit

(2) Liquidtight flexible metal conduit

(3) Liquidtight flexible nonmetallic conduit

(4) Flexible cords and cables, or conductors grouped together and taped or corded, shall be permitted to be installed without a raceway. They shall be located to be protected from physical damage, shall be of a flame-retardant type, and shall be part of the following:

  (5) Listed equipment

  (6) A driving machine, or

  (7) A driving machine brake

(B) Escalators.

(1) Wiring Methods.

Flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit shall be permitted in escalator and moving walk wellways. Flexible metal conduit or liquidtight flexible conduit of metric designator 12 (trade size ⅜) shall be permitted in lengths not in excess of 1.8 m (6 ft).

Exception: Metric designator 12 (trade size ⅜), nominal, or larger liquidtight flexible nonmetallic conduit, as defined in 356.2(2), shall be permitted to be installed in lengths in excess of 1.8 m (6 ft).

(2) Class 2 Circuit Cables.

Cables used in Class 2 power-limited circuits shall be permitted to be installed within escalators and moving walkways, provided the cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

(3) Flexible Cords.

Hard-service cords that conform to the requirements of Article 400 (Table 400.4) shall be permitted as flexible connections on escalators and moving walk control panels and disconnecting means where the entire control panel and disconnecting means are arranged for removal from machine spaces as permitted in 620.5.

(C) Platform Lifts and Stairway Chairlift Raceways.

(1) Wiring Methods.

Flexible metal conduit or liquidtight flexible metal conduit shall be permitted in platform lifts and stairway chairlift runways and machinery spaces. Flexible metal conduit or liquidtight flexible conduit of metric designator 12 (trade size ⅜) shall be permitted in lengths not in excess of 1.8 m (6 ft).

Exception: Metric designator 12 (trade size ⅜) or larger liquidtight flexible nonmetallic conduit, as defined in 356.2(2), shall be permitted to be installed in lengths in excess of 1.8 m (6 ft).

(2) Class 2 Circuit Cables.

Cables used in Class 2 power-limited circuits shall be permitted to be installed within platform lifts and stairway chairlift runways and machinery spaces, provided the cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

(3) Flexible Cords and Cables.

Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted in lengths not to exceed 1.8 m (6 ft), provided the cords and cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

620.22 Branch Circuits for Car Lighting, Receptacle(s), Ventilation, Heating, and Air-Conditioning.

(A) Car Light Source.

A separate branch circuit shall supply the car lights, receptacle(s), auxiliary lighting power source, and ventilation on each elevator car. The overcurrent device protecting the branch circuit shall be located in the elevator machine room or control room/machinery space or control space.

Required lighting shall not be connected to the load side of a ground-fault circuit interrupter.

(B) Air-Conditioning and Heating Source.

A separate branch circuit shall supply the air-conditioning and heating units on each elevator car. The overcurrent device protecting the branch circuit shall be located in the elevator machine room or control room/machinery space or control space.

620.23 Branch Circuits for Machine Room or Control Room/Machinery Space or Control Space Lighting and Receptacle(s).

(A) Separate Branch Circuits.

The branch circuit(s) supplying the lighting for machine rooms, control rooms, machinery spaces, or control spaces shall be separate from the branch circuit(s) supplying the receptacle(s) in those places. These circuits shall supply no other loads.

Required lighting shall not be connected to the load side of a ground-fault circuit interrupter.

(B) Lighting Switch.

The machine room or control room/machinery space or control space lighting switch shall be located at the point of entry.

(C) Duplex Receptacle.

At least one 125-volt, single-phase, 15- or 20-ampere duplex receptacle shall be provided in each machine room or control room and machinery space or control space.

Informational Note: See ASME A17.1-~~2013~~ 201 **6** /CSA B44-13, *Safety Code for Elevators and Escalators*, for illumination levels.

620.24 Branch Circuit for Hoistway Pit Lighting and Receptacles.

(A) Separate Branch Circuits.

Separate branch circuits shall supply the hoistway pit lighting and receptacles.

Required lighting shall not be connected to the load side of a ground-fault circuit interrupter.

(B) Lighting Switch.

The lighting switch shall be so located as to be readily accessible from the pit access door.

(C) Duplex Receptacle.

At least one 125-volt, single-phase, 15- or 20-ampere duplex receptacle shall be provided in the hoistway pit.

> Informational Note No. 1: See ASME A17.1-~~2013~~ 201 **6** /CSA B44-13, *Safety Code for Elevators and Escalators*, for illumination levels.
>
> Informational Note No. 2: See 620.85 for ground-fault circuit-interrupter requirements.

620.25 Branch Circuits for Other Utilization Equipment.

(A) Additional Branch Circuits.

Additional branch circuit(s) shall supply utilization equipment not identified in 620.22, 620.23, and 620.24. Other utilization equipment shall be restricted to that equipment identified in 620.1.

(B) Overcurrent Devices.

The overcurrent devices protecting the branch circuit(s) shall be located in the elevator machinery room or control room/machinery space or control space.

Part IV. Installation of Conductors

620.32 Metal Wireways and Nonmetallic Wireways.

The sum of the cross-sectional area of the individual conductors in a wireway shall not be more than 50 percent of the interior cross-sectional area of the wireway.

Vertical runs of wireways shall be securely supported at intervals not exceeding 4.5 m (15 ft) and shall have not more than one joint between supports. Adjoining wireway sections shall be securely fastened together to provide a rigid joint.

620.33 Number of Conductors in Raceways.

The sum of the cross-sectional area of the individual conductors in raceways shall not exceed 40 percent of the interior cross-sectional area of the raceway, except as permitted in 620.32 for wireways.

620.34 Supports.

Supports for cables or raceways in a hoistway or in an escalator or moving walk wellway or platform lift and stairway chairlift runway shall be securely fastened to the guide rail; escalator or moving walk truss; or to the hoistway, wellway, or runway construction.

620.35 Auxiliary Gutters.

Auxiliary gutters shall not be subject to the restrictions of 366.12(2) covering length or of 366.22 covering number of conductors.

620.36 Different Systems in One Raceway or Traveling Cable.

Optical fiber cables and conductors for operating devices, operation and motion control, power, signaling, fire alarm, lighting, heating, and air-conditioning circuits of 1000 volts or less shall be permitted to be run in the same traveling cable or raceway system if all conductors are insulated for the maximum voltage applied to any conductor within the cables or raceway system and if all live parts of the equipment are insulated from ground for this maximum voltage. Such a traveling cable or raceway shall also be permitted to include shielded conductors and/or one or more coaxial cables if such conductors are insulated for the maximum voltage applied to any conductor within the cable or raceway system. Conductors shall be permitted to be covered with suitable shielding for telephone, audio, video, or higher frequency communications circuits.

620.37 Wiring in Hoistways, Machine Rooms, Control Rooms, Machinery Spaces, and Control Spaces.

(A) Uses Permitted.

Only such electrical wiring, raceways, and cables used directly in connection with the elevator or dumbwaiter, including wiring for signals, for communication with the car, for lighting, heating, air conditioning, and ventilating the elevator car, for fire detecting systems, for pit sump pumps, and for heating, lighting, and ventilating the hoistway, shall be permitted inside the hoistway, machine rooms, control rooms, machinery spaces, and control spaces.

(B) Lightning Protection.

Bonding of elevator rails (car and/or counterweight) to a lightning protection system down conductor(s) shall be permitted. The lightning protection system down conductor(s) shall not be located within the hoistway. Elevator rails or other hoistway equipment shall not be used as the down conductor for lightning protection systems.

> Informational Note: See 250.106 for bonding requirements. For further information, see NFPA 780-2014, *Standard for the Installation of Lightning Protection Systems*.

(C) Main Feeders.

Main feeders for supplying power to elevators and dumbwaiters shall be installed outside the hoistway unless as follows:

(1) By special permission, feeders for elevators shall be permitted within an existing hoistway if no conductors are spliced within the hoistway.

(2) Feeders shall be permitted inside the hoistway for elevators with driving machine motors located in the hoistway or on the car or counterweight.

620.38 Electrical Equipment in Garages and Similar Occupancies.

Electrical equipment and wiring used for elevators, dumbwaiters, escalators, moving walks, and platform lifts and stairway chairlifts in garages shall comply with the requirements of Article 511.

> Informational Note: Garages used for parking or storage and where no repair work is done in accordance with 511.3(A) are not classified.

Part V. Traveling Cables

620.41 Suspension of Traveling Cables.

Traveling cables shall be suspended at the car and hoistways' ends, or counterweight end where applicable, so as to reduce the strain on the individual copper conductors to a minimum.

Traveling cables shall be supported by one of the following means:

(1) By their steel supporting member(s)

(2) By looping the cables around supports for unsupported lengths less than 30 m (100 ft)

(3) By suspending from the supports by a means that automatically tightens around the cable when tension is increased for unsupported lengths up to 60 m (200 ft)

Unsupported length for the hoistway suspension means shall be that length of cable measured from the point of suspension in the hoistway to the bottom of the loop, with the elevator car located at the bottom landing. Unsupported length for the car suspension means shall be that length of cable measured from the point of suspension on the car to the bottom of the loop, with the elevator car located at the top landing.

620.42 Hazardous (Classified) Locations.

In hazardous (classified) locations, traveling cables shall be of a type approved for hazardous (classified) locations as permitted in 501.? 10(B)? (2)? (7), 502.10(B)(2)(6), 503.10(A)(3)(6), 505.15(C)? (2), and 506.15(A)(6).

620.43 Location of and Protection for Cables.

Traveling cable supports shall be located so as to reduce to a minimum the possibility of damage due to the cables coming in contact with the hoistway construction or equipment in the hoistway. Where necessary, suitable guards shall be provided to protect the cables against damage.

620.44 Installation of Traveling Cables.

Traveling cables that are suitably supported and protected from physical damage shall be permitted to be run without the use of a raceway in either or both of the following:

(1) When used inside the hoistway, on the elevator car, hoistway wall, counterweight, or controllers and machinery that are located inside the hoistway, provided the cables are in the original sheath.

(2) From inside the hoistway, to elevator controller enclosures and to elevator car and machine room, control room, machinery space, and control space connections that are located outside the hoistway for a distance not exceeding 1.8 m (6 ft) in length as measured from the first point of support on the elevator car or hoistway wall, or counterweight where applicable, provided the conductors are grouped together and taped or corded, or in the original sheath. These traveling cables shall be permitted to be continued to this equipment.

Part VI. Disconnecting Means and Control

620.51 Disconnecting Means.

A single means for disconnecting all ungrounded main power supply conductors for each elevator, dumbwaiter, escalator, moving walk, platform lift, or stairway chairlift shall be provided and be designed so that no pole can be operated independently. Where multiple driving machines are connected to a single elevator, escalator, moving walk, or pumping unit, there shall be one disconnecting means to disconnect the motor(s) and control valve operating magnets.

The disconnecting means for the main power supply conductors shall not disconnect the branch circuit required in 620.22, 620.23, and 620.24.

(A) Type.

The disconnecting means shall be an enclosed externally operable fused motor circuit switch or circuit breaker that is lockable open in accordance with 110.25.

The disconnecting means shall be a listed device.

Informational Note: For additional information, see ASME A17.1-~~2013~~ 201 **6** /CSA B44-13, *Safety Code for Elevators and Escalators*.

Exception No. 1: Where an individual branch circuit supplies a platform lift, the disconnecting means required by 620.51(C)(4) shall be permitted to comply with 430.109(C). This disconnecting means shall be listed and shall be lockable open in accordance with 110.25.

Exception No. 2: Where an individual branch circuit supplies a stairway chairlift, the stairway chairlift shall be permitted to be cord-and-plug-connected, provided it complies with 422.16(A) and the cord does not exceed 1.8 m (6 ft) in length.

(B) Operation.

No provision shall be made to open or close this disconnecting means from any other part of the premises. If sprinklers are installed in hoistways, machine rooms, control rooms, machinery spaces, or control spaces, the disconnecting means shall be permitted to automatically open the power supply to the affected elevator(s) prior to the application of water. No provision shall be made to automatically close this disconnecting means. Power shall only be restored by manual means.

Informational Note: To reduce hazards associated with water on live elevator electrical equipment.

(C) Location.

The disconnecting means shall be located where it is readily accessible to qualified persons.

(1) On Elevators Without Generator Field Control.

On elevators without generator field control, the disconnecting means shall be located within sight of the motor controller. Where the motor controller is located in the elevator hoistway, the disconnecting means required by 620.51(A) shall be located outside the hoistway and accessible to qualified persons only. An additional fused or non-fused, enclosed, externally operable motor-circuit switch that is lockable open in accordance with 110.25 to disconnect all ungrounded main power-supply conductors shall be located within sight of the motor controller. The additional switch shall be a listed device and shall comply with 620.91(C).

Driving machines or motion and operation controllers not within sight of the disconnecting means shall be provided with a manually operated switch installed in the control circuit to prevent starting. The manually operated switch(es) shall be installed adjacent to this equipment.

Where the driving machine of an electric elevator or the hydraulic machine of a hydraulic elevator is located in a remote machine room or remote machinery space, a single means for disconnecting all ungrounded main power-supply conductors shall be provided and be lockable open in accordance with 110.25.

(2) On Elevators with Generator Field Control.

On elevators with generator field control, the disconnecting means shall be located within sight of the motor controller for the driving motor of the motor-generator set. Driving machines, motor-generator sets, or motion and operation controllers not within sight of the disconnecting means shall be provided with a manually operated switch installed in the control circuit to prevent starting. The manually operated switch(es) shall be installed adjacent to this equipment.

Where the driving machine or the motor-generator set is located in a remote machine room or remote machinery space, a single means for disconnecting all ungrounded main power-supply conductors shall be provided and be lockable open in accordance with 110.25.

(3) On Escalators and Moving Walks.

On escalators and moving walks, the disconnecting means shall be installed in the space where the controller is located.

(4) On Platform Lifts and Stairway Chairlifts.

On platform lifts and stairway chairlifts, the disconnecting means shall be located within sight of the motor controller.

(D) Identification and Signs.

(1) More than One Driving Machine.

Where there is more than one driving machine in a machine room, the disconnecting means shall be numbered to correspond to the identifying number of the driving machine that they control.

The disconnecting means shall be provided with a sign to identify the location of the supply side overcurrent protective device.

(2) Available Short-Circuit Current Field Marking.

Where an elevator control panel is used, it shall be legibly marked in the field with the maximum available short-circuit current at its line terminals. The field marking(s) shall include the date the short-circuit current calculation was performed and be of sufficient durability to withstand the environment involved.

When modifications to the electrical installation occur that affect the maximum available short-circuit current at the elevator control panel, the maximum available short-circuit current shall be verified or recalculated as necessary to ensure the elevator control panel's short-circuit current rating is sufficient for the maximum available short-circuit current at the line terminals of the equipment. The required field marking(s) shall be adjusted to reflect the new level of maximum available short-circuit current.

(E) Surge Protection.

Where any of the disconnecting means in 620.51 has been designated as supplying an emergency system load, surge protection shall be provided.

620.52 Power from More Than One Source.

(A) Single-Car and Multicar Installations.

On single-car and multicar installations, equipment receiving electrical power from more than one source shall be provided with a disconnecting means for each source of electrical power. The disconnecting means shall be within sight of the equipment served.

(B) Warning Sign for Multiple Disconnecting Means.

Where multiple disconnecting means are used and parts of the controllers remain energized from a source other than the one disconnected, a warning sign shall be mounted on or next to the disconnecting means. The sign shall be clearly legible and shall read as follows:

WARNING

PARTS OF THE CONTROLLER ARE NOT

DE-ENERGIZED BY THIS SWITCH.

The warning sign(s) or label(s) shall comply with 110.21(B).

(C) Interconnection Multicar Controllers.

Where interconnections between controllers are necessary for the operation of the system on multicar installations that remain energized from a source other than the one disconnected, a warning sign in accordance with 620.52(B) shall be mounted on or next to the disconnecting means.

620.53 Car Light, Receptacle(s), and Ventilation Disconnecting Means.

Elevators shall have a single means for disconnecting all ungrounded car light, receptacle(s), and ventilation power-supply conductors for that elevator car.

The disconnecting means shall be an enclosed, externally operable, fused motor-circuit switch or circuit breaker that is lockable open in accordance with 110.25 and shall be located in the machine room or control room for that elevator car. Where there is no machine room or control room, the disconnecting means shall be located in a machinery space or control space outside the hoistway that is readily accessible to only qualified persons.

Disconnecting means shall be numbered to correspond to the identifying number of the elevator car whose light source they control.

The disconnecting means shall be provided with a sign to identify the location of the supply side overcurrent protective device.

Exception: Where a separate branch circuit supplies car lighting, a receptacle(s), and a ventilation motor not exceeding 2 hp, the disconnecting means required by 620.53 shall be permitted to comply with 430.109(C). This disconnecting means shall be listed and shall be lockable open in accordance with 110.25.

620.54 Heating and Air-Conditioning Disconnecting Means.

Elevators shall have a single means for disconnecting all ungrounded car heating and air-conditioning power-supply conductors for that elevator car.

The disconnecting means shall be an enclosed, externally operable, fused motor-circuit switch or circuit breaker that is lockable open in accordance with 110.25 and shall be located in the machine room or control room for that elevator car. Where there is no machine room or control room, the disconnecting means shall be located in a machinery space or control space outside the hoistway that is readily accessible to only qualified persons.

Where there is equipment for more than one elevator car in the machine room, the disconnecting means shall be numbered to correspond to the identifying number of the elevator car whose heating and air-conditioning source they control.

The disconnecting means shall be provided with a sign to identify the location of the supply side overcurrent protective device.

620.55 Utilization Equipment Disconnecting Means.

Each branch circuit for other utilization equipment shall have a single means for disconnecting all ungrounded conductors. The disconnecting means shall be lockable open in accordance with 110.25.

Where there is more than one branch circuit for other utilization equipment, the disconnecting means shall be numbered to correspond to the identifying number of the equipment served. The disconnecting means shall be provided with a sign to identify the location of the supply side overcurrent protective device.

Part VII. Overcurrent Protection

620.61 Overcurrent Protection.

Overcurrent protection shall be provided in accordance with 620.61(A) through (D)

(A) Operating Devices and Control and Signaling Circuits.

Operating devices and control and signaling circuits shall be protected against overcurrent in accordance with the requirements of 725.43 and 725.45.

Class 2 power-limited circuits shall be protected against overcurrent in accordance with the requirements of Chapter 9, Notes to Tables 11(A) and 11(B).

(B) Overload Protection for Motors.

Motor and branch-circuit overload protection shall conform to Article 430, Part III, and (B)(1) through (B)(4).

(1) Duty Rating on Elevator, Dumbwaiter, and Motor-Generator Sets Driving Motors.

Duty on elevator and dumbwaiter driving machine motors and driving motors of motor-generators used with generator field control shall be rated as intermittent. Such motors shall be permitted to be protected against overload in accordance with 430.33.

(2) Duty Rating on Escalator Motors.

Duty on escalator and moving walk driving machine motors shall be rated as continuous. Such motors shall be protected against overload in accordance with 430.32.

(3) Overload Protection.

Escalator and moving walk driving machine motors and driving motors of motor-generator sets shall be protected against running overload as provided in Table 430.37.

(4) Duty Rating and Overload Protection on Platform Lift and Stairway Chairlift Motors.

Duty on platform lift and stairway chairlift driving machine motors shall be rated as intermittent. Such motors shall be permitted to be protected against overload in accordance with 430.33.

Informational Note: For further information, see 430.44 for orderly shutdown.

(C) Motor Feeder Short-Circuit and Ground-Fault Protection.

Motor feeder short-circuit and ground-fault protection shall be as required in Article 430, Part V.

(D) Motor Branch-Circuit Short-Circuit and Ground-Fault Protection.

Motor branch-circuit short-circuit and ground-fault protection shall be as required in Article 430, Part IV.

620.62 Selective Coordination.

Where more than one driving machine disconnecting means is supplied by a single feeder, the overcurrent protective devices in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified person engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Part VIII. Machine Rooms, Control Rooms, Machinery Spaces, and Control Spaces

620.71 Guarding Equipment.

Elevator, dumbwaiter, escalator, and moving walk driving machines; motor-generator sets; motor controllers; and disconnecting means shall be installed in a room or space set aside for that purpose unless otherwise permitted in 620.71(A) or (B). The room or space shall be secured against unauthorized access.

(A) Motor Controllers.

Motor controllers shall be permitted outside the spaces herein specified, provided they are in enclosures with doors or removable panels that are capable of being locked in the closed position and the disconnecting means is located adjacent to or is an integral part of the motor controller. Motor controller enclosures for escalator or moving walks shall be permitted in the balustrade on the side located away from the moving steps or moving treadway. If the disconnecting means is an integral part of the motor controller, it shall be operable without opening the enclosure.

(B) Driving Machines.

Elevators with driving machines located on the car, on the counterweight, or in the hoistway, and driving machines for dumbwaiters, platform lifts, and stairway lifts, shall be permitted outside the spaces herein specified.

Part IX. Grounding

620.81 Metal Raceways Attached to Cars.

Metal raceways, Type MC cable, Type MI cable, or Type AC cable attached to elevator cars shall be bonded to metal parts of the car that are bonded to the equipment grounding conductor.

620.82 Electric Elevators.

For electric elevators, the frames of all motors, elevator machines, controllers, and the metal enclosures for all electrical equipment in or on the car or in the hoistway shall be bonded in accordance with Article 250, Parts V and VII.

620.83 Nonelectric Elevators.

For elevators other than electric having any electrical conductors attached to the car, the metal frame of the car, where normally accessible to persons, shall be bonded in accordance with Article 250, Parts V and VII.

620.84 Escalators, Moving Walks, Platform Lifts, and Stairway Chairlifts.

Escalators, moving walks, platform lifts, and stairway chairlifts shall comply with Article 250.

620.85 Ground-Fault Circuit-Interrupter Protection for Personnel.

Each 125-volt, single-phase, 15- and 20-ampere receptacle installed in pits, in hoistways, on the cars of elevators and dumbwaiters associated with wind turbine tower elevators, on the platforms or in the runways and machinery spaces of platform lifts and stairway chairlifts, and in escalator and moving walk wellways shall be of the ground-fault circuit-interrupter type.

All 125-volt, single-phase, 15- and 20-ampere receptacles installed in machine rooms, control spaces, and control rooms shall have ground-fault circuit-interrupter protection for personnel.

A single receptacle supplying a permanently installed sump pump shall not require ground-fault circuit-interrupter protection.

Part X. Emergency and Standby Power Systems

620.91 Emergency and Standby Power Systems.

An elevator(s) shall be permitted to be powered by an emergency or standby power system.

Informational Note: See ASME A17.1-~~2013~~ 201 **6** /CSA B44-13, *Safety Code for Elevators and Escalators*, 2.27.2, for additional information.

(A) Regenerative Power.

For elevator systems that regenerate power back into the power source that is unable to absorb the regenerative power under overhauling elevator load conditions, a means shall be provided to absorb this power.

(B) Other Building Loads.

Other building loads, such as power and lighting, shall be permitted as the energy absorption means required in 620.91(A), provided that such loads are automatically connected to the emergency or standby power system operating the elevators and are large enough to absorb the elevator regenerative power.

(C) Disconnecting Means.

The disconnecting means required by 620.51 shall disconnect the elevator from both the emergency or standby power system and the normal power system.

Where an additional power source is connected to the load side of the disconnecting means, which allows automatic movement of the car to permit evacuation of passengers, the disconnecting means required in 620.51 shall be provided with an auxiliary contact that is positively opened mechanically, and the opening shall not be solely dependent on springs. This contact shall cause the additional power source to be disconnected from its load when the disconnecting means is in the open position.

Statement of Problem and Substantiation for Public Input

Referenced current edition of national consensus standards.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 723-NFPA 70-2017 [Section No. 610.1]	Referenced current national consensus standards.

Submitter Information Verification

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Submittal Date: Sun May 14 22:42:57 EDT 2017

Copyright Assignment

Public Input No. 293-NFPA 70-2017 [Part VII.]

Part VII. Overcurrent Protection Relocate thsi to Article 240.

Statement of Problem and Substantiation for Public Input

All overcurrent protection requirements should be consolidated in Article 240 for more convenient reading and to have all overcurrent protection under one code making panel.

Submitter Information Verification

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Submittal Date: Fri Feb 24 13:06:04 EST 2017

Public Input No. 4073-NFPA 70-2017 [Part IX.]

Part IX. Grounding and Bonding

Statement of Problem and Substantiation for Public Input

The requirements in 620.81, 620.82 and 620.83 include both equipment grounding requirements in addition to bonding requirements, thus the need for changing the title of Part IX. Section 620.81, 82, and 83 have been editorially revised to accurately provide both equipment grounding requirements in addition to bonding requirements. As revised, these sections now refer to the applicable parts of Article 250 in a manner consistent with the NEC Style Manual requirements. Other editorial revisions were made for clarity and to ensure that the requirements of this section align with the performance language in Part I of Article 250 (Section 250.4) and use of defined grounding and bonding words and terms in Article 100.

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Submittal Date: Thu Sep 07 13:29:10 EDT 2017

Public Input No. 748-NFPA 70-2017 [Section No. 620.1]

620.1 Scope.

This article covers the installation of electrical equipment and wiring used in connection with elevators, dumbwaiters, escalators, moving walks, platform lifts, ~~and stairway chairlifts.~~ stairway chairlifts, s idewalk elevators, p rivate residence elevators, h and elevators, m aterial lifts and dumbwaiters with automatic transfer devices,s pecial purpose personnel elevators Inclined elevators, m arine elevators, s crew-column elevators, r ooftop elevators, r ack-and-pinion elevators, l imited-use/limited-application elevators, e levators used for construction, m ine elevators and w ind turbine elevators

Informational Note No. 1: For further information, see ASME A17.1-2013/CSA B44-13, *Safety Code for Elevators and Escalators*.

Informational Note No. 2: For further information, see CSA B44.1-11/ASME-A17.5-2014,*Elevator and Escalator Electrical Equipment*.

Informational Note No. 3: The term *wheelchair lift* has been changed to *platform lift*. For further information, see ASME A18.1-2014, *Safety Standard for Platform Lifts and Stairway Chairlifts*.

Statement of Problem and Substantiation for Public Input

Improves clarity for the user concerning scope and aligns with ASME A17 and ASME A18 reference documents.

Submitter Information Verification

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Organization: International Union of Elevator Constructors

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Submittal Date: Wed May 17 21:15:41 EDT 2017

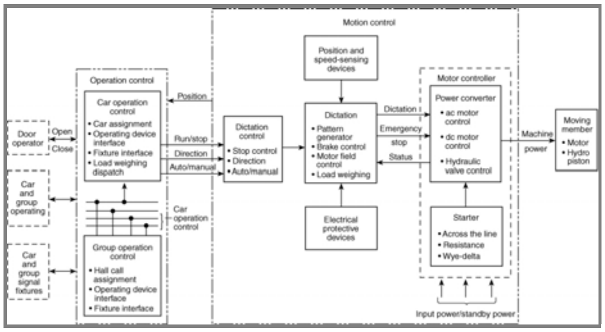
Public Input No. 1913-NFPA 70-2017 [Section No. 620.2]

620.2 Definitions. The definitions in this section shall apply only within this article.

Informational Note No. 1: The motor controller, motion controller, and operation controller are located in a single enclosure or a combination of enclosures.

Informational Note No. 2: Informational Note Figure 620.2, No. 2 is for information only.

Figure Informational Note Figure 620.2, No. 2 Control System.



Control Room (for Elevator, Dumbwaiter).

An enclosed control space outside the hoistway, intended for full bodily entry, that contains the elevator motor controller. The room could also contain electrical and/or mechanical equipment used directly in connection with the elevator or dumbwaiter but not the electric driving machine or the hydraulic machine.

Control Space (for Elevator, Dumbwaiter).

A space inside or outside the hoistway, intended to be accessed with or without full bodily entry, that contains the elevator motor controller. This space could also contain electrical and/or mechanical equipment used directly in connection with the elevator or dumbwaiter but not the electrical driving machine or the hydraulic machine.

Control System.

The overall system governing the starting, stopping, direction of motion, acceleration, speed, and retardation of the moving member.

Controller, Motion.

The electrical device(s) for that part of the control system that governs the acceleration, speed, retardation, and stopping of the moving member.

Controller, Motor.

The operative units of the control system comprised of the starter device(s) and power conversion equipment used to drive an electric motor, or the pumping unit used to power hydraulic control equipment.

Controller, Operation.

The electrical device(s) for that part of the control system that initiates the starting, stopping, and direction of motion in response to a signal from an operating device.

Machine Room (for Elevator, Dumbwaiter).

An enclosed machinery space outside the hoistway, intended for full bodily entry, that contains the electrical driving machine or the hydraulic machine. The room could also contain electrical and/or mechanical equipment used directly in connection with the elevator or dumbwaiter.

Machinery Space (for Elevator, Dumbwaiter).

A space inside or outside the hoistway, intended to be accessed with or without full bodily entry, that contains elevator or dumbwaiter mechanical equipment, and could also contain electrical equipment used directly in connection with the elevator or dumbwaiter. This space could also contain the electrical driving machine or the hydraulic machine.

Operating Device.

The car switch, pushbuttons, key or toggle switch(s), or other devices used to activate the operation controller.

Remote Machine Room and Control Room (for Elevator, Dumbwaiter).

A machine room or control room that is not attached to the outside perimeter or surface of the walls, ceiling, or floor of the hoistway.

Remote Machinery Space and Control Space (for Elevator, Dumbwaiter).

A machinery space or control space that is not within the hoistway, machine room, or control room and that is not attached to the outside perimeter or surface of the walls, ceiling, or floor of the hoistway.

Signal Equipment.

Includes audible and visual equipment such as chimes, gongs, lights, and displays that convey information to the user.

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of task group appointed by the NEC Correlating Committee. This task group was appointed to identify potential issues in the NEC with respect to how definitions in both Article 100 and the XXX.2 sections of this Code apply. The member of the task group are: David Hittinger, Rich Holub, Chris Hunter, Dave Williams, Chris Porter, Alan Manche, Ken Boyce, John Kovacik, Donny Cook, Dave Kendall and Jim Dollard.

Section 2.2.2.1 of the NEC Style Manual requires that in general definitions that appear in two or more articles be located in Article 100. Section 2.2.2.2 requires that where an individual article contains definition(s), they be located in the second section (XXX.2) of the article. It is extremely important to note that the style manual does not prohibit a definition in the second section of an article from applying elsewhere in the NEC. The style manual clearly states that in general definitions that appear in two or more articles shall be located in Article 100. This has confused many code users in the past. This style manual requirement is accurate and these public inputs are simply an attempt to provide needed clarity. See the example below:

344.2 Definition.
Rigid Metal Conduit (RMC). A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.

The definition of the term “rigid metal conduit” is appropriately located in the article that contains general, installation and construction specifications for this raceway. It is commonly understood that the term “rigid metal conduit” is used in more than one article. There are many articles that contain a single definition that is necessary for application of the contained requirements but will apply elsewhere in the NEC. This occurs in articles that address cable assemblies, raceways, systems and more.
This public input seeks to delete the last sentence in the first paragraph, as it is unnecessary. A new sentence is proposed to simply inform the user of the code that definitions are also found in the second section (XXX.2) of other articles.
This public input is supplemented with proposed revisions to the second section (XXX.2) of articles that contain definitions. New parent text is proposed for these sections to increase clarity and usability. There are two different scenarios that will be addressed. First, any second section (XXX.2) that contains definitions that apply only within that article will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply only within this article.

Second, any second section (XXX.2) that contains definitions that apply within the individual article and throughout the code will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply within this article and throughout the code.

In a few cases, in the second section (XXX.2) of an Article there are definitions that will apply only in that Article and some that will apply in that Article and throughout the code. New parent text and first level subdivisions are proposed to achieve clarity and usability The combination of these proposed revisions will provide necessary clarity and usability with respect to application of definitions. These actions will also achieve compliance with the NEC Style Manual.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1202-NFPA 70-2017 [Article 100 [Excluding any Sub-Sections]]	

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Submittal Date: Tue Aug 08 13:12:58 EDT 2017

Public Input No. 3654-NFPA 70-2017 [Definition: Machinery Space (for Elevator, Dumbwaiter).]

Machinery Space (for Elevator, Dumbwaiter).

A space inside or outside the hoistway, intended to be accessed with or without full bodily entry, that ~~contains~~ may contain elevator or dumbwaiter mechanical equipment, and could also contain electrical equipment used directly in connection with the elevator or dumbwaiter. This space could also contain the electrical driving machine or the hydraulic machine.

Statement of Problem and Substantiation for Public Input

There may be spaces that contain elevator electrical equipment but not mechanical equipment. These spaces were not previously covered by any of the defined spaces. This makes the definition consistent with what is shown in Appendix Q of ASME A17.1/CSA B44.
Please note, this proposal has been reviewed and endorsed by the National Elevator Industry, Inc. (NEII) Central Code Committee

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Public Input No. 752-NFPA 70-2017 [Section No. 620.4]

620.4 Live Parts Enclosed.

All live parts of electrical apparatus in the hoistways, at the landings, in or on the cars of elevators and dumbwaiters, in the wellways or the landings of escalators or moving walks, or in the runways and machinery spaces of platform lifts and stairway chairlifts shall be enclosed to protect against accidental contact.

~~Informational Note: See 110.27 for guarding of live parts (1000 volts, nominal, or less).~~

Statement of Problem and Substantiation for Public Input

Rationale is that we want to move away from naming safety requirements that depend on a location such as seen in the existing language. If it's a conveyance and its covered in Article 620 then live parts need to be enclosed.

Submitter Information Verification

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Submittal Date: Thu May 18 01:06:52 EDT 2017

Public Input No. 753-NFPA 70-2017 [Section No. 620.4]

620. ~~4~~ 4 Live Parts Enclosed. ~~All live parts of electrical apparatus~~

~~in the hoistways, at the landings, in or on the cars of elevators and dumbwaiters, in the wellways or the landings of escalators or moving walks, or in the runways and machinery spaces of platform lifts and stairway chairlifts~~

within the scope of Article 620 shall be enclosed to protect against accidental contact.

Informational Note: See 110.27 for guarding of live parts (1000 volts, nominal, or less).

Statement of Problem and Substantiation for Public Input

Exposed parts of electrical apparatus may increase hazards to persons associated with the possible release of energy caused by contact or approach to energized electrical conductors or circuit parts.

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Submittal Date: Thu May 18 01:08:41 EDT 2017

Public Input No. 17-NFPA 70-2017 [Section No. 620.5 [Excluding any Sub-Sections]]

Working space shall be provided about controllers, disconnecting means, and other electrical equipment in accordance with 110.26(A).

Where conditions of maintenance and supervision ensure that only qualified elevator persons examine, adjust, service, and maintain the equipment, the clearance requirements of 110.26(A) shall not be required where any of the conditions in 620.5(A) through (D) are met.

Statement of Problem and Substantiation for Public Input

Clarifies who is the subject of clearance requirements of 110.26 (A) shall not be required where any of the conditions in 620.5(A) through (D) are met.

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Submittal Date: Fri Jan 20 19:06:18 EST 2017

Public Input No. 751-NFPA 70-2017 [Section No. 620.5 [Excluding any Sub-Sections]]

Working space shall be provided about controllers, disconnecting means, and other electrical equipment in accordance with 110.26(A). Any space meeting the criteria as defined by Article 620.5 shall be lit by a permanently installed electric lighting with a lighting intensity of at least 200 lx (19 fc) within the working space.

Where conditions of maintenance and supervision ensure that only qualified persons examine, adjust, service, and maintain the equipment, the clearance requirements of 110.26(A) shall not be required where any of the conditions in 620.5(A) through (D) are met.

Statement of Problem and Substantiation for Public Input

To ensure uniform lighting in areas requiring access to equipment.

Submitter Information Verification

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Submittal Date: Thu May 18 00:48:12 EDT 2017

Public Input No. 750-NFPA 70-2017 [Section No. 620.11(D)]

(D) Insulation.

All conductors shall have an insulation voltage rating equal to at least the maximum nominal circuit voltage applied to any conductor within the enclosure, cable, or raceway. Insulations and outer coverings that are marked for limited smoke and are so listed shall be permitted. Conductors or cables that undergo jacket removal at any portion of the conductor or cable shall be protected using an approved method using material equivalent or greater than the conductor or cables factory original thickness and insulative properties.

Statement of Problem and Substantiation for Public Input

Maintain manufacture conductor integrity for safety.

Submitter Information Verification

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Submittal Date: Thu May 18 00:28:38 EDT 2017

Public Input No. 2787-NFPA 70-2017 [New Section after 620.13(D)]

(E) Fire Protection.

Where the following elevator types are provided, the feeder and branch-circuit conductors that provide normal or legally required standby power, control signals, communication with the car, lighting, heating, air conditioning, ventilation, and fire detecting systems, shall meet the additional requirements of section 700.10(D)(1);

(1) Fire Service Access Elevator, where such conductors are located outside the elevator hoistway and machine room.

(2) Occupant Evacuation Elevator, where such conductors are located outside the elevator hoistway, machine room, control room and control space.

Informational Note: For additional information on Fire Service Access Elevator and Occupant Evacuation Elevator, refer to local Building Code and AHJ.

Statement of Problem and Substantiation for Public Input

Propose to add requirements for protection of circuits for new special elevators that used as Fire Access Elevator and Occupant Evacuation Elevator. The additional wiring protection insures the operation of such elevators and has been required by the International Building Code since 2009. Also, addressed in NFPA 72-2013.

In high-rise buildings, elevators are considered vital to firefighters to fight fires and rescue occupants. Fire Service Access Elevator (FSAE) is used to provide firefighters with a safer and quicker means to fight fires and rescue occupants in the upper floors of high-rise buildings. The FSAE is required in high-rise buildings over 120 feet in height.

Occupant Evacuation Elevators are used as an exception to the required third exit stairway for buildings over 420 feet in height known as tall buildings. The OEE are intended to be used by building occupants to evacuate the building during fire emergencies.

Submitter Information Verification

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Public Input No. 1275-NFPA 70-2017 [Section No. 620.16(B)]

(B) Installation.

The elevator control panel shall not be installed where the available ~~short-circuit~~ fault current exceeds its short-circuit current rating, as marked in accordance with 620.16(A).

Statement of Problem and Substantiation for Public Input

The Fault Current Working Group was formed to support the Correlating Committee's Usability Task Group. Members of the Fault Current Working Group included Scott Blizard, Jim Dollard, Carl Fredericks, Jeff Hidaka, Chris Jensen, Alan Manche, and Vince Saporita. The goal of the Fault Current Working Group was to analyze the usage of the terms "short-circuit" and "fault" throughout the NEC, and submit Public Inputs, as appropriate, to improve clarity, consistency, and usability.

While "short-circuit" and "fault" have been used interchangeably throughout the NEC (and the whole electrical industry), there are subtle differences between the two. This has resulted in confusion and a lack of consistency. Thus, numerous related Public Inputs have been submitted by the Working Group.

The definition of "Fault Current, Available (Available Fault Current)" is taken from SR8 of NFPA70E-2018. The definition ("The largest amount of current capable of being delivered at a point on the system during a short-circuit condition") clarifies that "available fault current" is the highest short-circuit current that can flow at a particular point in the electrical system. The Informational Note, also taken from SR8 of NFPA70E-2018, ("A short-circuit can occur during abnormal conditions such as a fault between circuit conductors or a ground fault. See Figure 100.0") provides an example of the relationship between "short-circuit" and "fault". Figure 100.0, also from SR8 of NFPA70E-2018, helps explain the difference between "available fault current", "short-circuit current rating", and "interrupting rating".

"Available short-circuit current" and "short-circuit current" are changed to "available fault current" for improved consistency.

"Maximum" is deleted in front of "maximum available fault current" (and "maximum available short-circuit current") because the new definition of "available fault current" clearly includes the maximum (largest). The only exceptions, which remain unchanged, are in 250.4(A)(5) and 250.4(B)(3), where the word "maximum" is still appropriate and is necessary for a complete understanding of the requirement.

Equipment and component fault current ratings, short-circuit ratings, and short-circuit withstand ratings are changed to "short-circuit current ratings", in agreement with equipment and component listing standards. The only exceptions, which remain unchanged, are for switch "fault closing ratings", also to be in agreement with existing equipment and component listing standards.

Finally, "Short-circuit current calculation" is replaced with "available fault current calculation", improving consistency.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1246-NFPA 70-2017 [Definition: Coordination, Selective (Selective Coordination...]	PI from Fault Current Working Group
Public Input No. 1247-NFPA 70-2017 [New Definition after Definition: Externally Operable.]	PI from Fault Current Working Group
Public Input No. 1248-NFPA 70-2017 [New Definition after Definition: Externally Operable.]	PI from Fault Current Working Group
Public Input No. 1249-NFPA 70-2017 [Section No. 110.24(A)]	PI from Fault Current Working Group
Public Input No. 1250-NFPA 70-2017 [Section No. 110.24(B)]	PI from Fault Current Working Group
Public Input No. 1251-NFPA 70-2017 [Section No. 225.52(B)]	PI from Fault Current Working Group
Public Input No. 1252-NFPA 70-2017 [Section No. 230.82]	PI from Fault Current Working Group
Public Input No. 1253-NFPA 70-2017 [Section No. 230.205(B)]	PI from Fault Current Working Group

Public Input No. 1254-NFPA 70-2017 [Section No. 368.258]	PI from Fault Current Working Group
Public Input No. 1255-NFPA 70-2017 [Section No. 430.99]	PI from Fault Current Working Group
Public Input No. 1256-NFPA 70-2017 [Section No. 445.11]	PI from Fault Current Working Group
Public Input No. 1257-NFPA 70-2017 [Section No. 480.7(D)]	PI from Fault Current Working Group
Public Input No. 1258-NFPA 70-2017 [Section No. 490.21(A)(4)]	PI from Fault Current Working Group
Public Input No. 1259-NFPA 70-2017 [Section No. 490.21(B)(2)]	PI from Fault Current Working Group
Public Input No. 1260-NFPA 70-2017 [Section No. 490.21(C)(3)]	PI from Fault Current Working Group
Public Input No. 1263-NFPA 70-2017 [Section No. 490.21(D)(2)]	PI from Fault Current Working Group
Public Input No. 1264-NFPA 70-2017 [Section No. 490.21(D)(4)]	PI from Fault Current Working Group
Public Input No. 1265-NFPA 70-2017 [Section No. 490.21(E) [Excluding any Sub-Sections]]	PI from Fault Current Working Group
Public Input No. 1266-NFPA 70-2017 [Section No. 440.10(B)]	PI from Fault Current Working Group
Public Input No. 1267-NFPA 70-2017 [Section No. 505.7(F)]	PI from Fault Current Working Group
Public Input No. 1271-NFPA 70-2017 [Section No. 545.13]	PI from Fault Current Working Group
Public Input No. 1272-NFPA 70-2017 [Section No. 550.15(K)]	PI from Fault Current Working Group
Public Input No. 1273-NFPA 70-2017 [Section No. 551.47(O)]	PI from Fault Current Working Group
Public Input No. 1274-NFPA 70-2017 [Section No. 552.48(N)]	PI from Fault Current Working Group
Public Input No. 1276-NFPA 70-2017 [Section No. 620.51(D)(2)]	PI from Fault Current Working Group
Public Input No. 1277-NFPA 70-2017 [Sections 670.5(1), 670.5(2)]	PI from Fault Current Working Group
Public Input No. 1281-NFPA 70-2017 [Section No. 690.8(A)(1)]	PI from Fault Current Working Group
Public Input No. 1282-NFPA 70-2017 [Section No. 690.8(D)]	PI from Fault Current Working Group
Public Input No. 1283-NFPA 70-2017 [Section No. 690.9(A)]	PI from Fault Current Working Group
Public Input No. 1284-NFPA 70-2017 [Section No. 690.13(E)]	PI from Fault Current Working Group
Public Input No. 1285-NFPA 70-2017 [Section No. 690.15(B)]	PI from Fault Current Working Group
Public Input No. 1286-NFPA 70-2017 [Section No. 690.32]	PI from Fault Current Working Group
Public Input No. 1287-NFPA 70-2017 [Section No. 695.6(I)]	PI from Fault Current Working Group
Public Input No. 1288-NFPA 70-2017 [Section No. 700.4(A)]	PI from Fault Current Working Group

Public Input No. 1289-NFPA 70-2017 [Section No. 701.4]	PI from Fault Current Working Group
Public Input No. 1290-NFPA 70-2017 [Section No. 702.4(A)]	PI from Fault Current Working Group
Public Input No. 1291-NFPA 70-2017 [Section No. 705.22]	PI from Fault Current Working Group
Public Input No. 1292-NFPA 70-2017 [Section No. 705.31]	PI from Fault Current Working Group
Public Input No. 1293-NFPA 70-2017 [Section No. 705.65(A)]	PI from Fault Current Working Group
Public Input No. 1294-NFPA 70-2017 [Section No. 706.7(D)]	PI from Fault Current Working Group
Public Input No. 1295-NFPA 70-2017 [Section No. 712.65]	PI from Fault Current Working Group
Public Input No. 1296-NFPA 70-2017 [Section No. 712.72]	PI from Fault Current Working Group
Public Input No. 1297-NFPA 70-2017 [Definition: Feeder Neutral Conductor]	PI from Fault Current Working Group

Submitter Information Verification

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Submittal Date: Mon Jul 24 15:12:25 EDT 2017

Public Input No. 3637-NFPA 70-2017 [Section No. 620.21 [Excluding any Sub-Sections]]

Conductors and optical fibers located in hoistways, in escalator and moving walk wellways, in platform lifts, stairway chairlift runways, machinery spaces, control spaces, in or on cars, in machine rooms and control rooms, not including the traveling cables connecting the car or counterweight and hoistway wiring, shall be installed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, rigid nonmetallic conduit, or wireways, or shall be Type MC, MI, or AC cable unless otherwise permitted in 620.21(A) through (C).

Exception: Cords and cables of listed cord- and plug-connected equipment shall not be required to be installed in a raceway.

Informational Note: When an elevator is classified as a "Fire Service Access Elevator", some building codes require wires or cables that are located outside of the elevator hoistway and machine room and that provide normal or standby power, control signals, communication with the car, lighting, heating, air conditioning, ventilation and fire-detecting systems to fire service access elevators be protected by construction having a fire-resistance rating of not less than 2 hours, or be a circuit integrity cable having a fire-resistance rating of not less than 2 hours or be protected by a listed electrical protective system having a fire-resistance rating of not less than 2 hours.

Statement of Problem and Substantiation for Public Input

The 2015 International Building Code requires protected construction for the feeders and elevator wiring that extends outside the elevator control room if the elevator is classified as a "Fire Service Access Elevator". Section 3007.8.1 of the 2015 ICC has very prescriptive requirements. While the NEC® should not dictate this for all elevators, and since we don't define an elevator as a Fire Service Access Elevator, I thought it would be appropriate to caution the user that the building code may have such prescriptive requirements and the proposed informational note is so worded to not be a "requirement".

Submitter Information Verification

Submitter Full Name: Richard Holub

Organization: The DuPont Company Inc

Street Address:

City:

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Zip:

Submittal Date: Wed Sep 06 15:47:58 EDT 2017

Public Input No. 754-NFPA 70-2017 [Section No. 620.21 [Excluding any Sub-Sections]]

Conductors and optical fibers located in hoistways, in escalator and moving walk wellways, in platform lifts, stairway chairlift runways, machinery spaces, control spaces, in or on cars, in machine rooms and control rooms, not including the traveling cables connecting the car or counterweight and hoistway wiring, shall be installed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, rigid nonmetallic conduit, or wireways, or shall be Type MC, MI, or AC cable unless otherwise permitted in 620.21(A) through (C). Unused conductors in an enclosure shall be insulated or protected from accidental contact with energized circuit components and/or conductors.

Exception: Cords and cables of listed cord- and plug-connected equipment shall not be required to be installed in a raceway.

Statement of Problem and Substantiation for Public Input

Prevent used conductors from contacting live energized devices.

Submitter Information Verification

Submitter Full Name: Frank Belio

Organization: International Union of Elevato

Affilliation: IUEC

Street Address:

City:

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Submittal Date: Thu May 18 01:13:33 EDT 2017

Public Input No. 755-NFPA 70-2017 [Section No. 620.21 [Excluding any Sub-Sections]]

Conductors and optical fibers located in hoistways, in escalator and moving walk wellways, in platform lifts, stairway chairlift runways, machinery spaces, control spaces, in or on cars, in machine rooms and control rooms, not including the traveling cables connecting the car or counterweight and hoistway wiring, shall be installed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, rigid nonmetallic conduit, or wireways, or shall be Type MC, MI, or AC cable unless otherwise permitted in 620.21(A) through (C). Hangars and supports for wiring shall meet the following requirements:

(1) They shall be insulated.

(2) They shall be listed.

Exception: Cords and cables of listed cord- and plug-connected equipment shall not be required to be installed in a raceway.

Statement of Problem and Substantiation for Public Input

To ensure hangers and supports do not damage conductor manufacture specification.

Submitter Information Verification

Submitter Full Name: Frank Belio

Organization: International Union of Elevato

Affilliation: IUEC

Street Address:

City:

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Submittal Date: Thu May 18 01:31:58 EDT 2017

Public Input No. 4064-NFPA 70-2017 [New Section after 620.21(A)(1)]

(e) Hard-serice cords and junior hard-service cords that conform to the requirements of Article 400 (Table 400.4) shall be permitted as flexible connections between the fixed wiring in the hoistway and hoistway access switches when located in the hoistway door sight guard (see ASME A17.1-2016).

Statement of Problem and Substantiation for Public Input

ASME A17.1-2016 now allows elevator hoistway access switches to be located in the elevator hoistway door sight guard. The proposal specifies the required cables.

Please note, this proposal has been reviewed and endorsed by the National Elevator Industry, Inc. (NEII) Central Code Committee.

Submitter Information Verification

Submitter Full Name: Jeffrey Blain

Organization: Schindler Elevator Corporation

Affilliation: National Elevator Industry, Inc. (NEII)

Street Address:

City:

State:

Zip:

Submittal Date: Thu Sep 07 13:19:22 EDT 2017

Public Input No. 4082-NFPA 70-2017 [Section No. 620.22(A)]

(A) Car Light ~~Source~~ , Receptacle(s), Auxiliary Lighting and Ventilation .

A separate branch circuit shall supply the car lights~~, receptacle~~ . The car lights branch circuit is permitted to supply receptacle (s), ~~auxiliary~~ accessory equipment (alarm devices/bells monitoring devices not a part of the control system), auxiliary lighting power source, and ventilation on each elevator car or inside the operation controller . The overcurrent device protecting the branch circuit(s) shall be located in the elevator machine room or control room/machinery space or control space. Where there is no machine room, control room/machinery space or control space outside the hoistway, the overcurrent device shall be located outside the hoistway and accessible to qualified persons only.

Required lighting shall not be connected to the load side of a ground-fault circuit interrupter.

Statement of Problem and Substantiation for Public Input

NEC 1995 ROP 12-47 for 620-22 (log #1289) indicated that requirement 620-22 was understood to “permit” (not require) certain equipment on the lighting branch circuit and also affirmed by the Panel. It is a common practice in the industry to provide a convenience outlet or light in the operation controller to assist with maintenance or troubleshooting. It is also common to provide the alarm bell and alarm monitoring on this circuit for passenger safety when elevator power is lost.

NEC 1995 ROP statement 12-47 for 620.22 (log #1289): “To clearly identify equipment permitted on a separate branch circuit.”

Where there is no machine room or control room, there is often no machine space or control space outside of the hoistway. The proposed language was chosen to be similar to 620.51(C)(1).

Please note, this proposal has been reviewed and endorsed by the National Elevator Industry, Inc. (NEII) Central Code Committee

Submitter Information Verification

Submitter Full Name:	Jeffrey Blain
Organization:	Schindler Elevator Corporation
Affilliation:	National Elevator Industry, Inc. (NEII)
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City:	
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Submittal Date:	Thu Sep 07 13:42:02 EDT 2017

Public Input No. 668-NFPA 70-2017 [Section No. 620.23(C)]

(C) Duplex Receptacle.

At least one 125-volt, single-phase, 15- or 20-ampere duplex receptacle shall be provided in each machine room or control room and machinery space or control space. The receptacle(s) shall have ground-fault circuit-interrupter protection for personnel in accordance with Article 620.85.

Informational Note: See ASME A17.1-2013/CSA B44-13, *Safety Code for Elevators and Escalators*, for illumination levels.

Statement of Problem and Substantiation for Public Input

It is odd that this section mentions requiring a receptacle without mention of the GFCI requirement. The proposed change is for clarification purposes, and correctly ties this section to 620.85.

Submitter Information Verification

Submitter Full Name: Nick Sasso
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Submittal Date: Sun May 07 16:25:10 EDT 2017

Public Input No. 2748-NFPA 70-2017 [Section No. 620.25(B)]

(B) Overcurrent Devices.

The overcurrent devices protecting the branch circuit(s) shall be located in the elevator ~~machinery~~ machine room or control room/machinery space or control space.

Statement of Problem and Substantiation for Public Input

Rationale: correct terminology to align with ASME A17 language.

Submitter Information Verification

Submitter Full Name:	Frank Belio
Organization:	International Union of Elevato
Affilliation:	IUEC
Street Address:	
City:	
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Submittal Date:	Fri Aug 25 16:29:49 EDT 2017

Public Input No. 2749-NFPA 70-2017 [Section No. 620.51 [Excluding any Sub-Sections]]

A single means for disconnecting all ungrounded main power supply conductors for each elevator, dumbwaiter, escalator, moving walk, platform lift, or stairway chairlift shall be provided and be designed so that no pole can be operated independently. Where multiple driving machines are connected to a single elevator, escalator, moving walk, or pumping unit, there shall be one disconnecting means to disconnect the motor(s) and control valve operating magnets.

The disconnecting means for the main power supply conductors shall not disconnect the branch ~~circuit~~ circuits required in 620.22, 620.23, and 620.24.

Statement of Problem and Substantiation for Public Input

Rationale: editorially correct language from singular to plural.

Submitter Information Verification

Submitter Full Name:	Frank Belio
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Affilliation:	IUEC
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Zip:	
Submittal Date:	Fri Aug 25 16:36:55 EDT 2017

Public Input No. 3622-NFPA 70-2017 [Section No. 620.51(A)]

(A) Type.

The disconnecting means shall be an enclosed externally operable fused motor circuit switch or circuit breaker that is lockable only in the open ~~in~~ position in accordance with 110.25.

The disconnecting means shall be a listed device.

Informational Note: For additional information, see ASME A17.1-2013/CSA B44-13, *Safety Code for Elevators and Escalators*.

Exception No. 1: Where an individual branch circuit supplies a platform lift, the disconnecting means required by 620.51(C)(4) shall be permitted to comply with 430.109(C). This disconnecting means shall be listed and shall be lockable open in accordance with 110.25.

Exception No. 2: Where an individual branch circuit supplies a stairway chairlift, the stairway chairlift shall be permitted to be cord-and-plug-connected, provided it complies with 422.16(A) and the cord does not exceed 1.8 m (6 ft) in length.

Statement of Problem and Substantiation for Public Input

Submitted on behalf of Jerry Henry (member ASME A17.1 Elevator Electrical Committee): Allowing an elevator or escalator disconnect to be lockable in the "closed" position can result in serious injury or death to authorized machine room personnel and potentially passengers. As an IUEC Elevator mechanic on at least four (4) occasions having immediate access to an unlocked disconnect allowed power to be immediately removed from the elevator
to prevent electrical or mechanical injury to authorized machine room personnel. On at least one occasion death would have resulted if the disconnect had been locked in the "closed" position.
Please note, this proposal has been reviewed and endorsed by the ASME A17.1 Elevator and Escalator Committee, and the National Elevator Industry, Inc. (NEII) Central Code Committee

Submitter Information Verification

Submitter Full Name: Jeffrey Blain

Organization: Schindler Elevator Corporation

Affilliation: National Elevator Industry, Inc. (NEII)

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Submittal Date: Wed Sep 06 15:22:10 EDT 2017

Public Input No. 1276-NFPA 70-2017 [Section No. 620.51(D)(2)]

(2) Available ~~Short-Circuit~~ Fault Current Field Marking.

Where an elevator control panel is used, it shall be legibly marked in the field with the ~~maximum~~ available ~~short-circuit~~ fault current at its line terminals. The field marking(s) shall include the date the ~~short-circuit~~ available fault current calculation was performed and be of sufficient durability to withstand the environment involved.

When modifications to the electrical installation occur that affect the ~~maximum~~ available ~~short-circuit~~ fault current at the elevator control panel, the ~~maximum~~ available ~~short-circuit~~ fault current shall be verified or recalculated as necessary to ensure the elevator control panel's short-circuit current rating is sufficient for the ~~maximum~~ available ~~short-circuit~~ fault current at the line terminals of the equipment. The required field marking(s) shall be adjusted to reflect the new level of ~~maximum~~ available ~~short-circuit~~ fault current.

Statement of Problem and Substantiation for Public Input

The Fault Current Working Group was formed to support the Correlating Committee's Usability Task Group. Members of the Fault Current Working Group included Scott Blizard, Jim Dollard, Carl Fredericks, Jeff Hidaka, Chris Jensen, Alan Manche, and Vince Saporita. The goal of the Fault Current Working Group was to analyze the usage of the terms "short-circuit" and "fault" throughout the NEC, and submit Public Inputs, as appropriate, to improve clarity, consistency, and usability.

While "short-circuit" and "fault" have been used interchangeably throughout the NEC (and the whole electrical industry), there are subtle differences between the two. This has resulted in confusion and a lack of consistency. Thus, numerous related Public Inputs have been submitted by the Working Group.

The definition of "Fault Current, Available (Available Fault Current)" is taken from SR8 of NFPA70E-2018. The definition ("The largest amount of current capable of being delivered at a point on the system during a short-circuit condition") clarifies that "available fault current" is the highest short-circuit current that can flow at a particular point in the electrical system. The Informational Note, also taken from SR8 of NFPA70E-2018, ("A short-circuit can occur during abnormal conditions such as a fault between circuit conductors or a ground fault. See Figure 100.0") provides an example of the relationship between "short-circuit" and "fault". Figure 100.0, also from SR8 of NFPA70E-2018, helps explain the difference between "available fault current", "short-circuit current rating", and "interrupting rating".

"Available short-circuit current" and "short-circuit current" are changed to "available fault current" for improved consistency.

"Maximum" is deleted in front of "maximum available fault current" (and "maximum available short-circuit current") because the new definition of "available fault current" clearly includes the maximum (largest). The only exceptions, which remain unchanged, are in 250.4(A)(5) and 250.4(B)(3), where the word "maximum" is still appropriate and is necessary for a complete understanding of the requirement.

Equipment and component fault current ratings, short-circuit ratings, and short-circuit withstand ratings are changed to "short-circuit current ratings", in agreement with equipment and component listing standards. The only exceptions, which remain unchanged, are for switch "fault closing ratings", also to be in agreement with existing equipment and component listing standards.

Finally, "Short-circuit current calculation" is replaced with "available fault current calculation", improving consistency.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1246-NFPA 70-2017 [Definition: Coordination, Selective (Selective Coordination...]	PI from Fault Current Working Group
Public Input No. 1247-NFPA 70-2017 [New Definition after Definition: Externally Operable.]	PI from Fault Current Working Group
Public Input No. 1248-NFPA 70-2017 [New Definition after Definition: Externally Operable.]	PI from Fault Current Working Group
Public Input No. 1249-NFPA 70-2017 [Section No. 110.24(A)]	PI from Fault Current Working Group

Public Input No. 1250-NFPA 70-2017 [Section No. 110.24(B)]	PI from Fault Current Working Group
Public Input No. 1251-NFPA 70-2017 [Section No. 225.52(B)]	PI from Fault Current Working Group
Public Input No. 1252-NFPA 70-2017 [Section No. 230.82]	PI from Fault Current Working Group
Public Input No. 1253-NFPA 70-2017 [Section No. 230.205(B)]	PI from Fault Current Working Group
Public Input No. 1254-NFPA 70-2017 [Section No. 368.258]	PI from Fault Current Working Group
Public Input No. 1255-NFPA 70-2017 [Section No. 430.99]	PI from Fault Current Working Group
Public Input No. 1256-NFPA 70-2017 [Section No. 445.11]	PI from Fault Current Working Group
Public Input No. 1257-NFPA 70-2017 [Section No. 480.7(D)]	PI from Fault Current Working Group
Public Input No. 1258-NFPA 70-2017 [Section No. 490.21(A)(4)]	PI from Fault Current Working Group
Public Input No. 1259-NFPA 70-2017 [Section No. 490.21(B)(2)]	PI from Fault Current Working Group
Public Input No. 1260-NFPA 70-2017 [Section No. 490.21(C)(3)]	PI from Fault Current Working Group
Public Input No. 1263-NFPA 70-2017 [Section No. 490.21(D)(2)]	PI from Fault Current Working Group
Public Input No. 1264-NFPA 70-2017 [Section No. 490.21(D)(4)]	PI from Fault Current Working Group
Public Input No. 1265-NFPA 70-2017 [Section No. 490.21(E) [Excluding any Sub-Sections]]	PI from Fault Current Working Group
Public Input No. 1266-NFPA 70-2017 [Section No. 440.10(B)]	PI from Fault Current Working Group
Public Input No. 1267-NFPA 70-2017 [Section No. 505.7(F)]	PI from Fault Current Working Group
Public Input No. 1271-NFPA 70-2017 [Section No. 545.13]	PI from Fault Current Working Group
Public Input No. 1272-NFPA 70-2017 [Section No. 550.15(K)]	PI from Fault Current Working Group
Public Input No. 1273-NFPA 70-2017 [Section No. 551.47(O)]	PI from Fault Current Working Group
Public Input No. 1274-NFPA 70-2017 [Section No. 552.48(N)]	PI from Fault Current Working Group
Public Input No. 1275-NFPA 70-2017 [Section No. 620.16(B)]	PI from Fault Current Working Group
Public Input No. 1277-NFPA 70-2017 [Sections 670.5(1), 670.5(2)]	PI from Fault Current Working Group
Public Input No. 1281-NFPA 70-2017 [Section No. 690.8(A)(1)]	PI from Fault Current Working Group
Public Input No. 1282-NFPA 70-2017 [Section No. 690.8(D)]	PI from Fault Current Working Group
Public Input No. 1283-NFPA 70-2017 [Section No. 690.9(A)]	PI from Fault Current Working Group
Public Input No. 1284-NFPA 70-2017 [Section No. 690.13(E)]	PI from Fault Current Working Group

Public Input No. 1285-NFPA 70-2017 [Section No. 690.15(B)]	PI from Fault Current Working Group
Public Input No. 1286-NFPA 70-2017 [Section No. 690.32]	PI from Fault Current Working Group
Public Input No. 1287-NFPA 70-2017 [Section No. 695.6(I)]	PI from Fault Current Working Group
Public Input No. 1288-NFPA 70-2017 [Section No. 700.4(A)]	PI from Fault Current Working Group
Public Input No. 1289-NFPA 70-2017 [Section No. 701.4]	PI from Fault Current Working Group
Public Input No. 1290-NFPA 70-2017 [Section No. 702.4(A)]	PI from Fault Current Working Group
Public Input No. 1291-NFPA 70-2017 [Section No. 705.22]	PI from Fault Current Working Group
Public Input No. 1292-NFPA 70-2017 [Section No. 705.31]	PI from Fault Current Working Group
Public Input No. 1293-NFPA 70-2017 [Section No. 705.65(A)]	PI from Fault Current Working Group
Public Input No. 1294-NFPA 70-2017 [Section No. 706.7(D)]	PI from Fault Current Working Group
Public Input No. 1295-NFPA 70-2017 [Section No. 712.65]	PI from Fault Current Working Group
Public Input No. 1296-NFPA 70-2017 [Section No. 712.72]	PI from Fault Current Working Group
Public Input No. 1297-NFPA 70-2017 [Definition: Feeder Neutral Conductor]	PI from Fault Current Working Group

Submitter Information Verification

Submitter Full Name: Vincent Saporita

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Affilliation: Eatons Bussmann Business

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Submittal Date: Mon Jul 24 15:24:33 EDT 2017

Public Input No. 2752-NFPA 70-2017 [Section No. 620.51(E)]

(E) Surge Protection.

Where any of the disconnecting means in 620.51 has been designated as supplying an emergency system load, , legally required system load, or critical operation power system load, surge protection shall be provided.

Statement of Problem and Substantiation for Public Input

Surge protection is necessary for emergency, legally required and critical operations loads. This public input intends to expand the surge protection requirement to all loads that impact life safety.

Submitter Information Verification

Submitter Full Name: James Dollard
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City:
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Zip:

Submittal Date: Fri Aug 25 17:15:28 EDT 2017

Public Input No. 3518-NFPA 70-2017 [Section No. 620.51(E)]

(E) Surge Protection.

Where any of the disconnecting means in 620.51 has been designated as supplying an emergency system load, listed surge protection shall be provided.

Statement of Problem and Substantiation for Public Input

Surge-Protection Devices are required to be "listed" per 285.6.

Submitter Information Verification

Submitter Full Name: David Kendall

Organization: Thomas Betts Corporation

Street Address:

City:

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Submittal Date: Wed Sep 06 12:25:21 EDT 2017

Public Input No. 3671-NFPA 70-2017 [Section No. 620.53]

620.53 Car Light, Receptacle(s), and Ventilation Disconnecting Means.

Elevators shall have a single means for disconnecting all ungrounded car light, receptacle(s), and ventilation power-supply conductors for that elevator car.

The disconnecting means shall be an enclosed, externally operable, fused motor-circuit switch or circuit breaker that is lockable open in accordance with 110.25 and shall be located in the machine room or control room for that elevator car. Where there is no machine room or control room outside the hoistway, the disconnecting means shall be located ~~in a machinery space or control space~~ outside the hoistway ~~that is readily~~ and accessible to ~~only~~ qualified persons only.

Disconnecting means shall be numbered to correspond to the identifying number of the elevator car whose light source they control.

The disconnecting means shall be provided with a sign to identify the location of the supply side overcurrent protective device.

Exception: Where a separate branch circuit supplies car lighting, a receptacle(s), and a ventilation motor not exceeding 2 hp, the disconnecting means required by 620.53 shall be permitted to comply with 430.109(C). This disconnecting means shall be listed and shall be lockable open in accordance with 110.25.

Statement of Problem and Substantiation for Public Input

Where there is no machine room or control room, there is often no machine space or control space outside of the hoistway. The proposed language was chosen to be similar to 620.51(C)(1).
Please note, this proposal has been reviewed and endorsed by the National Elevator Industry, Inc. (NEII) Central Code Committee

Submitter Information Verification

Submitter Full Name: Jeffrey Blain
Organization: Schindler Elevator Corporation
Affilliation: National Elevator Industry, Inc. (NEII)
Street Address:
City:
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Submittal Date: Wed Sep 06 16:44:29 EDT 2017

Public Input No. 3687-NFPA 70-2017 [Section No. 620.54]

620.54 Heating and Air-Conditioning Disconnecting Means.

Elevators shall have a single means for disconnecting all ungrounded car heating and air-conditioning power-supply conductors for that elevator car.

The disconnecting means shall be an enclosed, externally operable, fused motor-circuit switch or circuit breaker that is lockable open in accordance with 110.25 and shall be located in the machine room or control room for that elevator car. Where there is no machine room or control room outside the hoistway, the disconnecting means shall be located ~~in a machinery space or control space~~ outside the ~~hoistway that is readily~~ hoistway and accessible to ~~only~~ qualified persons only.

Where there is equipment for more than one elevator car in the machine room, the disconnecting means shall be numbered to correspond to the identifying number of the elevator car whose heating and air-conditioning source they control.

The disconnecting means shall be provided with a sign to identify the location of the supply side overcurrent protective device.

Statement of Problem and Substantiation for Public Input

Where there is no machine room or control room, there is often no machine space or control space outside of the hoistway. The proposed language was chosen to be similar to 620.51(C)(1).
Please note, this proposal has been reviewed and endorsed by the National Elevator Industry, Inc. (NEII) Central Code Committee

Submitter Information Verification

Submitter Full Name:	Jeffrey Blain
Organization:	Schindler Elevator Corporation
Affilliation:	National Elevator Industry, Inc. (NEII)
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City:	
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Submittal Date:	Wed Sep 06 17:12:26 EDT 2017

Public Input No. 1945-NFPA 70-2017 [Section No. 620.62]

620.62 Selective Coordination.

Where more than one driving machine disconnecting means is supplied by a single feeder, the overcurrent protective devices in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified person engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Exception No.1: Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exists on the transformer secondary .

Exception No. 2: Between overcurrent protective devices of the same size (ampere rating) in series.

Statement of Problem and Substantiation for Public Input

There are two conditions where selective coordination is not possible, overcurrent devices in series and overcurrent devices on the primary and the secondary of a transformer. As currently worded, this section does not address these conditions. This proposed revision addresses both conditions (two overcurrent devices in series and overcurrent devices on the primary and secondary of a transformer) and provides clear language for both conditions. In addition, the proposed language in the exceptions matches the language currently found in the exceptions of NEC 517.32(G) which will provide consistency between these two sections of the NEC. In an attempt to achieve consistency between all NEC sections that require selective coordination, similar revisions will be proposed for the following sections:

NEC 645.27
NEC 695.3(C)(3)
NEC 700.32
NEC 701.27
NEC 708.54

Submitter Information Verification

Submitter Full Name:	Phillip Whisenhunt
Organization:	Harris Consulting Engineers
Affiliation:	I am not affiliated with any organization other than Harris Consulting Engineers in Las Vegas, Nevada
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Wed Aug 09 10:07:52 EDT 2017

Public Input No. 3451-NFPA 70-2017 [Section No. 620.62]

620.62 Selective Coordination.

Where more than one driving machine disconnecting means is supplied by a single feeder, the overcurrent protective devices in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified person engaged primarily in the design, installation, or maintenance of electrical systems. Devices used for selective coordination with adjustable settings shall have those settings adjusted and verified to insure proper coordination. The selection and device settings shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Statement of Problem and Substantiation for Public Input

A high percentage of systems designed for selective coordination utilize devices that have adjustable features. Many of these require electronic devices to setup and adjust. These adjustments must be performed to insure they will function to achieve the desired coordination. Often adjustable settings leave the factory set at minimums, in the design of selective coordination the settings must be adjusted in relationship to the other devices used within the system.
This added language will complete this concept, insuring that not only do we have a design and equipment installed that is capable of
coordination, but that it is properly adjusted to function as intended by the design professional. The documentation will provide the AHJ the needed verification for the project that not only is it installed but that it has been adjusted to perform the required coordination. This is basically a life safety issue that should not be taken lightly.
This report also provides the owner the information required for proper maintenance and servicing especially if future modifications are performed to the project.

Submitter Information Verification

Submitter Full Name: David Clements
Organization: Intl Assoc Elec Insp
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 06 10:03:59 EDT 2017

Public Input No. 3463-NFPA 70-2017 [Section No. 620.62]

620.62 Selective Coordination.

Where more than one driving machine disconnecting means is supplied by a single feeder, the overcurrent protective devices in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified person engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Exception: Selective coordination shall not be required between two overcurrent devices located in series if no loads are connected in parallel with the downstream device.

Statement of Problem and Substantiation for Public Input

This Public Input is to just add the exception that is used for selective coordination in Section 700.32 and 701.27.
The IAEI has also submitted a different Public Input for this section that would add additional wording to 620.62. (not reflected in this Public Input)

Submitter Information Verification

Submitter Full Name: David Clements

Organization: Intl Assoc Elec Insp

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City:

State:

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Submittal Date: Wed Sep 06 10:55:59 EDT 2017

Public Input No. 3668-NFPA 70-2017 [Section No. 620.62]

620.62 Selective Coordination.

Where more than one driving machine disconnecting means is supplied ~~by~~ from a single ~~feeder~~ electrical source , the overcurrent protective devices in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified person engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Statement of Problem and Substantiation for Public Input

A single feeder should not be the limiting factor in requiring selective coordination for elevators.

If a designer uses separate feeders for each elevator from the distribution equipment, he can avoid selective coordination, when in fact a fault on any one of the elevators could result in the main for the distribution panel opening without proper selective coordination. In that case, we would lose all the elevators and have a building power outage.

This change would result in selective coordination for elevators from a single source, and therefore would isolate a fault on one elevator from the rest of the elevators and distribution system.

The intent of 620.62 is to prevent multiple elevator outages due to a failure within one unit.

Submitter Information Verification

Submitter Full Name: Randal Hunter

Organization: HTS

Street Address:

City:

State:

Zip:

Submittal Date: Wed Sep 06 16:32:31 EDT 2017

Public Input No. 3688-NFPA 70-2017 [Section No. 620.62]

620.62 Selective Coordination.

Where more than one driving machine disconnecting means is supplied by a single feeder, the overcurrent protective devices in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified person engaged primarily in the design, installation, or maintenance of electrical systems. Devices used for selective coordination with adjustable settings shall have those settings adjusted and verified prior to building occupancy to insure proper coordination. The selection and device settings shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Statement of Problem and Substantiation for Public Input

A high percentage of systems designed for selective coordination utilize devices that have adjustable features. Many of these require electronic devices to setup and adjust. These adjustments must be performed to insure they will function to achieve the desired coordination. Often adjustable settings leave the factory set at minimums, and in the design of selective coordination the settings must be adjusted in relationship to the other devices used within the system.

This added language will complete this concept, insuring that not only do we have a design and equipment installed that is capable of coordination, but that it is properly adjusted to function as intended by the design professional. The documentation will provide the AHJ the needed verification for the project that not only is it installed but that it has been adjusted to perform the required coordination. This is basically a life safety issue that should not be taken lightly.

This report also provides the owner the information required for proper maintenance and servicing especially if future modifications are performed on the project.

We can have the best design, the best equipment made, and if it is not properly installed and adjusted it will never perform the desired selective coordination.

Submitter Information Verification

Submitter Full Name: Randal Hunter
Organization: HTS
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 06 17:12:56 EDT 2017

Public Input No. 3721-NFPA 70-2017 [Section No. 620.62]

620.62 Selective Coordination.

Where more than one driving machine disconnecting means is supplied by a single feeder, the overcurrent protective devices in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified person engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Exception: Selective coordination shall not be required between two overcurrent devices located in series if no loads are connected in parallel with the downstream device.

Statement of Problem and Substantiation for Public Input

The addition of this exception brings the selective coordination requirement in 620 into parity with Article 700 and 701 selective coordination requirements. If this exception is not included here, then selective coordination would be required for two devices that may be the same or very close in size. When the overcurrent devices protecting an elevator disconnect are equally or nearly equally sized, they typically cannot be selectively coordinated. An example would be a 150 amp fuse ahead of an elevator disconnect fuse sized at 125 amps, in which case selective coordination cannot be achieved. With no loads between these two devices, we should only have to coordinate with one of these devices. When doing selective coordination, the more levels of overcurrent devices that have to coordinate, the more difficult it becomes to create a coordinated system.

Submitter Information Verification

Submitter Full Name: Randal Hunter

Organization: HTS

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Submittal Date: Wed Sep 06 18:22:47 EDT 2017

Public Input No. 4352-NFPA 70-2017 [Section No. 620.62]

620.62 Selective Coordination.

Where more than one driving machine disconnecting means is supplied by a ~~single feeder~~ source , the overcurrent protective devices in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified person engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Statement of Problem and Substantiation for Public Input

If 2 or more elevators are provided and feed from a single source such as a switchboard with 2 or more separate feeders and overcurrent devices, under the current wording or this section, selective coordination of the elevator system is not required. This revised wording would meet the intent to the section.

Submitter Information Verification

Submitter Full Name: Howard Herndon

Organization: South West Electritech Service

Street Address:

City:

State:

Zip:

Submittal Date: Thu Sep 07 23:41:50 EDT 2017

Public Input No. 691-NFPA 70-2017 [Section No. 620.62]

620.62 Selective Coordination.

Where more than one driving machine disconnecting means is supplied by a single feeder, the overcurrent protective devices in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective devices.

Selective coordination overcurent protective devices shall be selected by a licensed professional engineer or other qualified person engaged primarily in the design, installation, or maintenance of electrical systems. Adjustable settings for the overcurrent protective devices selected shall also be set by the liscensed professional engineer or other qualified person prior to the inspection. The selection and device settings shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Statement of Problem and Substantiation for Public Input

I can unequivocally tell CMP 12 that 75% of the the inspections I have performed have had the LSIG or LSI breakers not match the coordination study. I can also tell you with a degree of certainty that most AHJ's do not check this crucial part of the service inspection. i have been an inspector for 16 years and do not see the feeder taps as much as i have in previous years but it still happens. Adding this sentence or something similar would be a great start. With the great cost in the design and the specialized breakers that have to occur to meet nec 620.62, it is all for nothing if the settings are not accurate. I tell you with certainty even after commissioning has been performed the settings are typically wrong. Often they are left at factory settings or random settings. I have seen the gamete. There is no direction in the NEC to who is responsible for this very important task. To meet the safeguarding purpose of the NEC this change would provide direction on who is responsible for the settings while instructing the AHJ to verify the settings match the study.

Submitter Information Verification

Submitter Full Name: James Dorsey
Organization: Douglas County Electrical Insp
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 12 10:23:00 EDT 2017

Public Input No. 2864-NFPA 70-2017 [New Section after 620.62]

TITLE OF NEW CONTENT

Equipment enclosures for selectively coordinated overcurrent devices shall be legibly markd in the field to indicate the overcurrent devices are selectively coordinated.The marking shall meet the requirements in 110.21(B) and shall be readily visible and state the following CAUTION-OVERCURRENT DEVICES ARE SELECTIVELY COORDINATED EXACT REPLACEMENTS AND TRIP SETTINGS REQUIRED

Statement of Problem and Substantiation for Public Input

The field marking will alert those who are authorized to maintain, inspect or work on the system that the overcurrent devices are selectively coordinated. The field marking will clearly identify what overcurrent devices are selectively coordinated per the engineer documentation after final inspections and for future modifications to the system

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2736-NFPA 70-2017 [New Section after 700.32]	

Submitter Information Verification

Submitter Full Name: Michael Dempsey

Organization: Trinity Code Inpsections

Street Address:

City:

State:

Zip:

Submittal Date: Mon Aug 28 13:42:54 EDT 2017

Public Input No. 4075-NFPA 70-2017 [Section No. 620.81]

620.81 Metal Raceways Attached to Cars.

Metal raceways, Type MC cable, Type MI cable, or Type AC cable attached to elevator cars shall be bonded to metal parts of the car that are ~~bonded~~ grounded through a connection to the required equipment grounding conductor.

Statement of Problem and Substantiation for Public Input

The requirements in 620.81, 620.82 and 620.83 include both equipment grounding requirements in addition to bonding requirements, thus the need for changing the title of Part IX. Section 620.81, 82, and 83 have been editorially revised to accurately provide both equipment grounding requirements in addition to bonding requirements. As revised, these sections now refer to the applicable parts of Article 250 in a manner consistent with the NEC Style Manual requirements. Other editorial revisions were made for clarity and to ensure that the requirements of this section align with the performance language in Part I of Article 250 (Section 250.4) and use of defined grounding and bonding words and terms in Article 100.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz

Organization: NECA

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City:

State:

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Submittal Date: Thu Sep 07 13:30:06 EDT 2017

Public Input No. 4089-NFPA 70-2017 [Section No. 620.82]

620.82 Electric Elevators.

For electric elevators, the frames of all motors, elevator machines, controllers, and the metal enclosures for all electrical equipment in or on the car or in the hoistway shall be ~~bonded~~ grounded in accordance with ~~Article 250~~ Parts I , ~~Parts V~~ VI and VII of Article 250 . Conductive parts of equipment shall be bonded in accordance with Part V of Article 250.

Statement of Problem and Substantiation for Public Input

The requirements in 620.81, 620.82 and 620.83 include both equipment grounding requirements in addition to bonding requirements, thus the need for changing the title of Part IX. Section 620.81, 82, and 83 have been editorially revised to accurately provide both equipment grounding requirements in addition to bonding requirements. As revised, these sections now refer to the applicable parts of Article 250 in a manner consistent with the NEC Style Manual requirements. Other editorial revisions were made for clarity and to ensure that the requirements of this section align with the performance language in Part I of Article 250 (Section 250.4) and use of defined grounding and bonding words and terms in Article 100.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz

Organization: NECA

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City:

State:

Zip:

Submittal Date: Thu Sep 07 13:51:14 EDT 2017

Public Input No. 4098-NFPA 70-2017 [Section No. 620.83]

620.83 Nonelectric Elevators.

For elevators other than electric having any electrical conductors attached to the car, the metal frame of the car, where normally accessible to persons, shall ~~be bonded~~ be grounded in accordance with Parts I, VI, and VII of Article 250 ~~, Parts V and VII.~~ . Conductive parts of equipment bonded in accordance with Part V of Article 250,

Statement of Problem and Substantiation for Public Input

The requirements in 620.81, 620.82 and 620.83 include both equipment grounding requirements in addition to bonding requirements, thus the need for changing the title of Part IX. Section 620.81, 82, and 83 have been editorially revised to accurately provide both equipment grounding requirements in addition to bonding requirements. As revised, these sections now refer to the applicable parts of Article 250 in a manner consistent with the NEC Style Manual requirements. Other editorial revisions were made for clarity and to ensure that the requirements of this section align with the performance language in Part I of Article 250 (Section 250.4) and use of defined grounding and bonding words and terms in Article 100.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz

Organization: NECA

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Submittal Date: Thu Sep 07 14:00:42 EDT 2017

Public Input No. 3641-NFPA 70-2017 [Section No. 620.85]

620.85 Ground-Fault Circuit-Interrupter Protection for Personnel.

Each 125-volt, single-phase, 15- and 20-ampere receptacle installed in pits, in hoistways, on the cars of elevators and dumbwaiters associated with wind turbine tower elevators, on the platforms or in the runways and machinery spaces of platform lifts and stairway chairlifts, and in escalator and moving walk wellways shall be of the ground-fault circuit-interrupter type.

All 125-volt, single-phase, 15- and 20-ampere receptacles installed in machine rooms, control spaces, and control rooms shall have ground-fault circuit-interrupter protection for personnel.

A ~~single receptacle supplying a~~ permanently installed sump pump ~~shall not require~~ is required to be permanently wired or to be supplied by a single receptacle that is not ground-fault circuit-interrupter ~~protection~~ protected .

Statement of Problem and Substantiation for Public Input

To clarify the acceptable power connections to the sump pump.
Please note, this proposal has been reviewed and endorsed by National Elevator Industry, Inc. (NEII) Central Code Committee

Submitter Information Verification

Submitter Full Name: Jeffrey Blain

Organization: Schindler Elevator Corporation

Affilliation: National Elevator Industry, Inc. (NEII)

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Submittal Date: Wed Sep 06 15:52:12 EDT 2017

Public Input No. 3616-NFPA 70-2017 [Section No. 620.91 [Excluding any Sub-Sections]]

An elevator(s) shall be permitted to be powered by an emergency or standby power system.

Informational Note No. 1 : See ASME A17.1-2013/CSA B44-13, *Safety Code for Elevators and Escalators*, 2.27.2, for additional information.

Informational Note No. 2: When an elevator is classified as a "Fire Service Access Elevator", some building codes require the elevator equipment, elevator hoistway lighting, ventilation and cooling equipment for elevator machine rooms, control rooms, machine spaces, and control spaces, as well as elevator car lighting to all have emergency or standby power systems in compliance with the building code.

Statement of Problem and Substantiation for Public Input

The 2015 International Building Code requires Type 60/Class 2/Level 1 standby power for each "Fire Service Access Elevator". Section 3007.8 of the 2015 ICC has very prescriptive requirements. While the NEC® should not dictate this for all elevators, and since we don't define an elevator as a Fire Service Access Elevator, I thought it would be appropriate to caution the user that the building code may have such prescriptive requirements and the proposed informational note is so worded to not be a "requirement".

Submitter Information Verification

Submitter Full Name: Richard Holub

Organization: The DuPont Company Inc

Street Address:

City:

State:

Zip:

Submittal Date: Wed Sep 06 15:14:42 EDT 2017

Public Input No. 2458-NFPA 70-2017 [Article 625]

Article 625 Electric ~~Vehicle Charging System~~ Vehicle Systems

Part I. General

625.1 Scope.

This article 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.

> Informational Note No. 1: For industrial trucks, see NFPA 505-2013, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operation*.
>
> Informational Note No. 2: UL 2594-2013, *Standard for Electric Vehicle Supply Equipment*, is a safety standard for conductive electric vehicle supply equipment. UL 2202-2009, *Standard for Electric Vehicle Charging System Equipment*, is a safety standard for conductive electric vehicle charging equipment.

625.2 Definitions.

Cable Management System.

An apparatus designed to control and organize the output cable to the electric vehicle or to the primary pad.

Charger Power Converter.

The device used to convert energy from the power grid to a high-frequency output for wireless power transfer.

Electric Vehicle.

An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. Plug-in hybrid electric vehicles (PHEV) are considered electric vehicles. For the purpose of this article, off-road, self-propelled electric vehicles, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats, and the like, are not included.

Electric Vehicle Connector.

A device that, when electrically coupled (conductive or inductive) to an electric vehicle inlet, establishes an electrical connection to the electric vehicle for the purpose of power transfer and information exchange. This device is part of the electric vehicle coupler.

> Informational Note: For further information, see 625.48 for interactive systems.

Electric Vehicle Coupler.

A mating electric vehicle inlet and electric vehicle connector set.

Electric Vehicle Inlet.

The device on the electric vehicle into which the electric vehicle connector is electrically coupled (conductive or inductive) for power transfer and information exchange. This device is part of the electric vehicle coupler. For the purposes of this *Code*, the electric vehicle inlet is considered to be part of the electric vehicle and not part of the electric vehicle supply equipment.

> Informational Note: For further information, see 625.48 for interactive systems.

Electric Vehicle Storage Battery.

A battery, comprised of one or more rechargeable electrochemical cells, that has no provision for the release of excessive gas pressure during normal charging and operation, or for the addition of water or electrolyte for external measurements of electrolyte-specific gravity.

Electric Vehicle Supply Equipment.

The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle.

Informational Note No. 1: For further information, see 625.48 for interactive systems.

Informational Note No. 2: Within this article, the terms *electric vehicle supply equipment* and *electric vehicle charging system equipment* are considered to be equivalent.

Fastened in Place.

Mounting means of an EVSE in which the fastening means are specifically designed to permit periodic removal for relocation, interchangeability, maintenance, or repair without the use of a tool.

Fixed in Place.

Mounting means of an EVSE attached to a wall or surface with fasteners that require a tool to be removed.

Output Cable to the Electric Vehicle.

An assembly consisting of a length of flexible EV cable and an electric vehicle connector (supplying power to the electric vehicle).

Output Cable to the Primary Pad.

A multi-conductor, shielded cable assembly consisting of conductors to carry the high-frequency energy and any status signals between the charger power converter and the primary pad.

Personnel Protection System.

A system of personnel protection devices and constructional features that when used together provide protection against electric shock of personnel.

Plug-In Hybrid Electric Vehicle (PHEV).

A type of electric vehicle intended for on-road use with the ability to store and use off-vehicle electrical energy in the rechargeable energy storage system, and having a second source of motive power.

Portable (as applied to EVSE).

A device intended for indoor or outdoor use that can be carried from charging location to charging location and is designed to be transported in the vehicle when not in use.

Power-Supply Cord.

An assembly consisting of an attachment plug and length of flexible cord that connects equipment to a receptacle.

Primary Pad.

A device external to the EV that provides power via the contactless coupling and may include the charger power converter.

Rechargeable Energy Storage System.

Any power source that has the capability to be charged and discharged.

Informational Note: Batteries, capacitors, and electromechanical flywheels are examples of rechargeable energy storage systems.

Wireless Power Transfer (WPT).

The transfer of electrical energy from a power source to an electrical load via electric and magnetic fields or waves by a contactless inductive means between a primary and a secondary device.

Wireless Power Transfer Equipment (WPTE).

Equipment consisting of a charger power converter and a primary pad. The two devices are either separate units or contained within one enclosure.

625.4 Voltages.

Unless other voltages are specified, the nominal ac system voltages of 120, 120/240, 208Y/120, 240, 480Y/277, 480, 600Y/347, 600, and 1000 volts and dc system voltages of up to 1000 volts shall be used to supply equipment covered by this article.

625.5 Listed.

EVSE or WPTE shall be listed.

Part II. Equipment Construction

625.10 Electric Vehicle Coupler.

The electric vehicle coupler shall comply with 625.10(A) through (D).

(A) Construction and Installation.

The electric vehicle coupler shall be constructed and installed so as to guard against inadvertent contact by persons with parts made live from the electric vehicle supply equipment or the electric vehicle battery.

(B) Unintentional Disconnection.

The electric vehicle coupler shall be provided with a positive means to prevent unintentional disconnection.

(C) Grounding Pole.

The electric vehicle coupler shall be provided with a grounding pole, unless provided as part of a listed isolated electric vehicle supply equipment system.

(D) Grounding Pole Requirements.

If a grounding pole is provided, the electric vehicle coupler shall be so designed that the grounding pole connection is the first to make and the last to break contact.

625.15 Markings.

The equipment shall comply with 625.15(A) through (C).

(A) General.

All equipment shall be marked by the manufacturer as follows:

FOR USE WITH ELECTRIC VEHICLES

(B) Ventilation Not Required.

Where marking is required by 625.52(A), the equipment shall be clearly marked by the manufacturer as follows:

VENTILATION NOT REQUIRED

The marking shall be located so as to be clearly visible after installation.

(C) Ventilation Required.

Where marking is required by 625.52(B), the equipment shall be clearly marked by the manufacturer, “Ventilation Required.” The marking shall be located so as to be clearly visible after installation.

625.16 Means of Coupling.

The means of coupling to the electric vehicle shall be conductive, inductive, or wireless power transfer. Attachment plugs, electric vehicle connectors, and electric vehicle inlets shall be listed or labeled for the purpose.

625.17 Cords and Cables.

(A) Power-Supply Cord.

The cable for cord-connected equipment shall comply with all of the following:

(1) Be any of the types specified in 625.17(B) or hard service cord, junior hard service cord, or portable power cable types in accordance with Table 400.4. Hard service cord, junior hard service cord, or portable power cable types shall be listed, as applicable, for exposure to oil and damp and wet locations.

(2) Have an ampacity as specified in Table 400.5(A)(1) or, for 8 AWG and larger, in the 60°C columns of Table 400.5(A)(2).

(3) Have an overall length as specified in 625.17(A)(3)a. or b as follows:

(4) When the interrupting device of the personnel protection system specified in 625.22 is located within the enclosure of the supply equipment or charging system, the power-supply cord shall be not more than 300 mm (12 in.) long,

(5) When the interrupting device of the personnel protection system specified in 625.22 is located at the attachment plug, or within the first 300 mm (12 in.) of the power-supply cord, the overall cord length shall be a minimum of 1.8 m (6 ft) and shall be not greater than 4.6 m (15 ft).

(B) Output Cable to the Electric Vehicle.

The output cable to the electric vehicle shall be Type EV, EVJ, EVE, EVJE, EVT, or EVJT flexible cable as specified in Table 400.4.

Informational Note: Listed electric vehicle supply equipment may incorporate output cables having ampacities greater than 60°C based on the permissible temperature limits for the components and the cable.

(C) Overall Cord and Cable Length.

The overall usable length shall not exceed 7.5 m (25 ft) unless equipped with a cable management system that is part of the listed electric vehicle supply equipment.

(1) Not Fastened in Place.

Where the electric vehicle supply equipment or charging system is not fastened in place, the cord-exposed usable length shall be measured from the face of the attachment plug to the face of the electric vehicle connector.

(2) Fastened in Place.

Where the electric vehicle supply equipment or charging system is fastened in place, the usable length of the output cable shall be measured from the cable exit of the electric vehicle supply equipment or charging system to the face of the electric vehicle connector.

625.18 Interlock.

Electric vehicle supply equipment shall be provided with an interlock that de-energizes the electric vehicle connector whenever the electrical connector is uncoupled from the electric vehicle. An interlock shall not be required for portable cord-and-plug-connected electric vehicle supply equipment intended for connection to receptacle outlets rated at 125 volts, single phase, 15 and 20 amperes. An interlock shall not be required for dc supplies less than 60 volts dc.

625.19 Automatic De-Energization of Cable.

The electric vehicle supply equipment or the cable-connector combination of the equipment shall be provided with an automatic means to de-energize the cable conductors and electric vehicle connector upon exposure to strain that could result in either cable rupture or separation of the cable from the electric connector and exposure of live parts. Automatic means to de-energize the cable conductors and electric vehicle connector shall not be required for portable electric vehicle supply equipment constructed in accordance with 625.44(A).

625.22 Personnel Protection System.

The equipment shall have a listed system of protection against electric shock of personnel. Where cord-and-plug-connected equipment is used, the interrupting device of a listed personnel protection system shall be provided and shall be an integral part of the attachment plug or shall be located in the power-supply cord not more than 300 mm (12 in.) from the attachment plug. A personnel protection system shall not be required for supplies less than 60 volts dc.

Part III. Installation

625.40 Electric Vehicle Branch Circuit.

Each outlet installed for the purpose of charging electric vehicles shall be supplied by an individual branch circuit. Each circuit shall have no other outlets.

625.41 Overcurrent Protection.

Overcurrent protection for feeders and branch circuits supplying equipment shall be sized for continuous duty and shall have a rating of not less than 125 percent of the maximum load of the equipment. Where noncontinuous loads are supplied from the same feeder, the overcurrent device shall have a rating of not less than the sum of the noncontinuous loads plus 125 percent of the continuous loads.

625.42 Rating.

The equipment shall have sufficient rating to supply the load served. Electric vehicle charging loads shall be considered to be continuous loads for the purposes of this article. Where an automatic load management system is used, the maximum equipment load on a service and feeder shall be the maximum load permitted by the automatic load management system.

625.43 Disconnecting Means.

For equipment rated more than 60 amperes or more than 150 volts to ground, the disconnecting means shall be provided and installed in a readily accessible location. The disconnecting means shall be lockable open in accordance with 110.25.

625.44 Equipment Connection.

Equipment shall be connected to the premises wiring system in accordance with one of the following:

(A) Portable Equipment.

Portable equipment shall be connected to the premises wiring systems by one or more of the following methods:

(1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 125 volts, single phase, 15 or 20 amperes

(2) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 250 volts, single phase, 15 or 20 amperes

(3) A nonlocking, 2-pole, 3-wire or 3-pole, 4-wire grounding-type receptacle outlet rated at 250 volts, single phase, 30 or 50 amperes

(4) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 60 volts dc maximum, 15 or 20 amperes

The length of the power supply cord, if provided, between the receptacle outlet and the equipment shall be in accordance with 625.17(A)(3).

(B) Stationary Equipment.

Stationary equipment intended to be fastened in place in such a way as to permit ready removal for interchange, facilitation of maintenance or repair, or repositioning shall be connected to the premises wiring system by one of the following methods:

(1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated 125 volt or 250 volt, single phase, up to 50 amperes

(2) A nonlocking, 3-pole, 4-wire grounding-type receptacle outlet rated 250 volt, three phase, up to 50 amperes

(3) Any of the receptacle outlets in 625.44(A)(1) or (2)

The length of the power supply cord, if provided, between the receptacle outlet and the equipment shall be in accordance with 625.17(A)(3).

(C) Fixed Equipment.

All other equipment shall be permanently wired and fixed in place to the supporting surface.

625.46 Loss of Primary Source.

Means shall be provided such that, upon loss of voltage from the utility or other electrical system(s), energy cannot be back fed through the electric vehicle and the supply equipment to the premises wiring system unless permitted by 625.48.

625.47 Multiple Feeder or Branch Circuits.

Where equipment is identified for the application, more than one feeder or branch circuit shall be permitted to supply equipment.

625.48 Interactive Systems.

Electric vehicle supply equipment that is part of an interactive system that serves as an optional standby system, an electric power production source, or a bidirectional power feed shall be listed, evaluated for use with the specific electric vehicles, and marked as suitable for that purpose. When used as an optional standby system, the requirements of Article 702 shall apply; when used as an electric power production source, the requirements of Article 705 shall apply.

> Informational Note: For further information on supply equipment, see ANSI/UL 1741, *Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources*, and ANSI/UL 9741, *Bidirectional Electric Vehicle (EV) Charging System Equipment*; for vehicle interactive systems, see SAE J3072, *Standard for Interconnection Requirements for Onboard, Utility-Interactive Inverter Systems*.

625.50 Location.

The electric vehicle supply equipment shall be located for direct electrical coupling of the EV connector (conductive or inductive) to the electric vehicle. Unless specifically listed and marked for the location, the coupling means of the electric vehicle supply equipment shall be stored or located at a height of not less than 450 mm (18 in.) above the floor level for indoor locations or 600 mm (24 in.) above the grade level for outdoor locations. This requirement does not apply to portable electric vehicle supply equipment constructed in accordance with 625.44(A).

625.52 Ventilation.

The ventilation requirement for charging an electric vehicle in an indoor enclosed space shall be determined by 625.52(A) or (B).

(A) Ventilation Not Required.

Where electric vehicle storage batteries are used or where the equipment is listed for charging electric vehicles indoors without ventilation and marked in accordance with 625.15(B), mechanical ventilation shall not be required.

(B) Ventilation Required.

Where the equipment is listed for charging electric vehicles that require ventilation for indoor charging, and is marked in accordance with 625.15(C), mechanical ventilation, such as a fan, shall be provided. The ventilation shall include both supply and exhaust equipment and shall be permanently installed and located to intake from, and vent directly to, the outdoors. Positive-pressure ventilation systems shall be permitted only in vehicle charging buildings or areas that have been specifically designed and approved for that application. Mechanical ventilation requirements shall be determined by one of the methods specified in 625.52(B)(1) through (B)(4).

(1) Table Values.

For supply voltages and currents specified in Table 625.52(B)(1)(a) or Table 625.52(B)(1)(b), the minimum ventilation requirements shall be as specified in Table 625.52(B)(1)(a) or Table 625.52(B)(1)(b)for each of the total number of electric vehicles that can be charged at one time.

Table 625.52(B)(1)(a) Minimum Ventilation Required in Cubic Meters per Minute (m^3/min) for Each of the Total Number of Electric Vehicles That Can Be Charged at One Time

Branch- Circuit Ampere Rating	Branch-Circuit Voltage							
	DC	Single Phase			3 Phase			
	= 50 V	120 V	208 V	240 V or 120/240 V	208 V or 208Y/120 V	240 V	480 V or 480Y/277 V	600 V or 600Y/347 V
15	0.5	1.1	1.8	2.1	—	—	—	—
20	0.6	1.4	2.4	2.8	4.2	4.8	9.7	12
30	0.9	2.1	3.6	4.2	6.3	7.2	15	18
40	1.2	2.8	4.8	5.6	8.4	9.7	19	24
50	1.5	3.5	6.1	7.0	10	12	24	30
60	1.8	4.2	7.3	8.4	13	15	29	36
100	2.9	7.0	12	14	21	24	48	60
150	—	—	—	—	31	36	73	91
200	—	—	—	—				

250	42 —	48 —	97 —	120 —
-				
300	52 —	60 —	120 —	150 —
-				
350	63 —	73 —	145 —	180 —
-				
400	73 —	85 —	170 —	210 —
-				
84	97	195	240	

Table 625.52(B)(1)(b) Minimum Ventilation Required in Cubic Feet per Minute (cfm) for Each of the Total Number of Electric Vehicles That Can Be Charged at One Time

Branch-

Circuit Ampere Rating

- - -

Branch-Circuit Voltage

-

Single Phase

-

3 Phase

	DC					
	= 50V	**120 V**	**208 V**	**240 V or 120/240 V**		
-						
		208 V or 208Y/120 V	**240 V**	**480 V or 480Y/277 V**	**600 V or 600Y/347 V**	
15	15.4	37	64	74		
-						
20		20.4 —	49 —	85 —	99 —	
-						
30		148 30.8	171 74	342 128	427 148	
-						
40		222 41.3	256 99	512 171	641 197	
-						
		296	342	683	854	

50	51.3	123	214	246
-				
	370	427	854	1066
60	61.7	148	256	296
-				
	444	512	1025	1281
100	102.5	246	427	493
-				
	740	854	1708	2135
150	—	—	—	—
-				
	1110	1281	2562	3203
200	—	—	—	—
-				
	1480	1708	3416	4270
250	—	—	—	—
-				
	1850	2135	4270	5338
300	—	—	—	—
-				
	2221	2562	5125	6406
350	—	—	—	—
-				
	2591	2989	5979	7473
400	—	—	—	—
-				
2961	3416	6832	8541	

(2) Other Values.

For supply voltages and currents other than specified in Table 625.52(B)(1)(a) or Table 625.52(B)(1)(b), the minimum ventilation requirements shall be calculated by means of the following general formulas, as applicable:

(1) Single-phase ac or dc:

Ventilation$_{\text{single-phase ac or dc}}$ in cubic meters per minute (m^3/min) =

$$\frac{(\text{volts})(\text{amperes})}{1718}$$ **[625.52(B)(2)a**

Ventilation$_{\text{single-phase ac or dc}}$ in cubic feet per minute (cfm) =

$$\frac{(\text{volts})(\text{amperes})}{48.7}$$ **[625.52(B)(2)b**

(2) Three-phase ac:

Ventilation$_{\text{3-phase}}$ in cubic meters per minute (m^3/min) =

$$\frac{1.732(\text{volts})(\text{amperes})}{1718}$$ **[625.52(B)(2)c**

Ventilation$_{\text{3-phase}}$ in cubic feet per minute (cfm) =

$$\frac{1.732(\text{volts})(\text{amperes})}{48.7}$$ **[625.52(B)(2)d**

(3) Engineered Systems.

For an equipment ventilation system designed by a person qualified to perform such calculations as an integral part of a building's total ventilation system, the minimum ventilation requirements shall be permitted to be determined in accordance with calculations specified in the engineering study.

(4) Supply Circuits.

The supply circuit to the mechanical ventilation equipment shall be electrically interlocked with the equipment and shall remain energized during the entire electric vehicle charging cycle. Equipment shall be marked in accordance with 625.15. Equipment receptacles rated at 125 volts, single phase, 15 and 20 amperes shall be marked in accordance with 625.15 and shall be switched, and the mechanical ventilation system shall be electrically interlocked through the switch supply power to the receptacle. Equipment supplied from less than 50 volts dc shall be marked in accordance with 625.15(C) and shall be switched, and the mechanical ventilation system shall be electrically interlocked through the switch supply power to the equipment.

625.54 Ground-Fault Circuit-Interrupter Protection for Personnel.

All single-phase receptacles installed for the connection of electric vehicle charging that are rated 150 volts to ground or less, and 50 amperes or less shall have ground-fault circuit-interrupter protection for personnel.

625.56 Receptacle Enclosures.

All receptacles installed in a wet location for electric vehicle charging shall have an enclosure that is weatherproof with the attachment plug cap inserted or removed.

Part IV. Wireless Power Transfer Equipment

625.101 Grounding.

The primary pad base plate shall be of a non-ferrous metal and shall be grounded unless the listed WPTE employs a double-insulation system. The base plate shall be sized to match the size of the primary pad enclosure.

625.102 Construction.

(A) Type.

The charger power converter, where integral to the primary pad, shall comply with 625.102(C). The charger power converter, if not integral to the primary pad, shall be provided with a minimum Type 3R enclosure rating.

(B) Installation.

If the charger power converter is not integral to the primary pad, it shall be mounted at a height of not less than 450 mm (18 in.) above the floor level for indoor locations or 600 mm (24 in.) above grade level for outdoor locations. The charger power converter shall be mounted in one of the following forms:

(1) Pedestal

(2) Wall or pole

(3) Building or structure

(4) Raised concrete pad

(C) Primary Pad.

The primary pad shall be installed on the surface, embedded in the surface of the floor with its top flush with the surface, or embedded in the surface of the floor with its top below the surface. This includes primary pad constructions with the charger power converter located in the primary pad enclosure.

(1) If the primary pad is located in an area requiring snow removal, it shall not be located on or above the surface.

Exception: Where installed on private property where snow removal is done manually, the primary pad shall be permitted to be located on or above the surface.

(2) The enclosure shall be provided with a suitable enclosure rating minimum Type 3. If the primary pad is located in an area subject to severe climatic conditions (e.g., flooding), it shall be suitably rated for those conditions or be provided with a suitably rated enclosure.

(D) Protection of the Output Cable.

The output cable to the primary pad shall be secured in place over its entire length for the purpose of restricting its movement and to prevent strain at the connection points. If installed in conditions where drive-over could occur, the cable shall be provided with supplemental protection. Where the charger power converter is a part of the primary pad assembly, the power supply cord to the primary pad shall also be protected.

(E) Other Wiring Systems.

Other wiring systems and fittings specifically listed for use on the WPTE shall be permitted.

Statement of Problem and Substantiation for Public Input

With the addition of power export equipment and bidirectional current flow equipment being proposed, a change to the title of the Article is needed to clarify that more than just charging equipment is included.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2442-NFPA 70-2017 [Section No. 90.2(A)]	
Public Input No. 2443-NFPA 70-2017 [Section No. 625.1]	
Public Input No. 2444-NFPA 70-2017 [New Definition after Definition: Electric Vehicle Storage B...]	
Public Input No. 2445-NFPA 70-2017 [Definition: Electric Vehicle Supply Equipment.]	
Public Input No. 2446-NFPA 70-2017 [Section No. 625.5]	
Public Input No. 2448-NFPA 70-2017 [Section No. 625.16]	
Public Input No. 2449-NFPA 70-2017 [New Section after 625.40]	
Public Input No. 2452-NFPA 70-2017 [Section No. 625.41]	
Public Input No. 2454-NFPA 70-2017 [Section No. 625.43]	
Public Input No. 2455-NFPA 70-2017 [Section No. 625.44]	

Public Input No. 2456-NFPA 70-2017 [Section No. 625.48]

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Public Input No. 2443-NFPA 70-2017 [Section No. 625.1]

625.1 Scope.

This article covers the installation of 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~~ :

(A) Connect an eectric vehicletoa supply of electricity for electric vehicle charging.

(B) Connect an electric vehicle to an external load for power export from the electric vehicle to electrical equipment or systems

(C) Connect an electric vehicle to a supply of electricity for charging and also for power export from the electric vehicle through the same equipment (bi-directional current flow) .

Informational Note No. 1: For industrial trucks, see NFPA 505-2013, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operation*.

Informational Note No. 2: UL 2594-2013, *Standard for Electric Vehicle Supply Equipment*, is a safety standard for conductive electric vehicle supply equipment. UL 2202-2009, *Standard for Electric Vehicle Charging System Equipment*, is a safety standard for conductive electric vehicle charging equipment.

Statement of Problem and Substantiation for Public Input

With the addition of bidirectional current flow devices and power export functionality being proposed, clarification in the scope that there are actually three operational use cases for equipment now covered - charging, power export (discharging), and bidirectional current flow devices (charging/discharging) - is needed.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2442-NFPA 70-2017 [Section No. 90.2(A)]	
Public Input No. 2444-NFPA 70-2017 [New Definition after Definition: Electric Vehicle Storage B...]	
Public Input No. 2445-NFPA 70-2017 [Definition: Electric Vehicle Supply Equipment.]	
Public Input No. 2446-NFPA 70-2017 [Section No. 625.5]	
Public Input No. 2448-NFPA 70-2017 [Section No. 625.16]	
Public Input No. 2449-NFPA 70-2017 [New Section after 625.40]	
Public Input No. 2452-NFPA 70-2017 [Section No. 625.41]	
Public Input No. 2454-NFPA 70-2017 [Section No. 625.43]	
Public Input No. 2455-NFPA 70-2017 [Section No. 625.44]	
Public Input No. 2456-NFPA 70-2017 [Section No. 625.48]	
Public Input No. 2458-NFPA 70-2017 [Article 625]	

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Public Input No. 2242-NFPA 70-2017 [Section No. 625.2]

625.2 Definitions.

~~**Cable Management System.**~~

~~An apparatus designed to control and organize the output cable to the electric vehicle or to the primary pad.~~

~~**Charger Power Converter.**~~

~~The device used to convert energy from the power grid to a high-frequency output for wireless power transfer~~

(A) Application Within this Article and throughout the Code. The following definition shall apply within this article and throughout the code .

Electric Vehicle.

An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. Plug-in hybrid electric vehicles (PHEV) are considered electric vehicles. For the purpose of this article, off-road, self-propelled electric vehicles, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats, and the like, are not included.

(B) Application Within this Article. The following definitions shall apply only within this article.

Cable Management System.

An apparatus designed to control and organize the output cable to the electric vehicle or to the primary pad.

Charger Power Converter.

The device used to convert energy from the power grid to a high-frequency output for wireless power transfer.

Electric Vehicle Connector.

A device that, when electrically coupled (conductive or inductive) to an electric vehicle inlet, establishes an electrical connection to the electric vehicle for the purpose of power transfer and information exchange. This device is part of the electric vehicle coupler.

Informational Note: For further information, see 625.48 for interactive systems.

Electric Vehicle Coupler.

A mating electric vehicle inlet and electric vehicle connector set.

Electric Vehicle Inlet.

The device on the electric vehicle into which the electric vehicle connector is electrically coupled (conductive or inductive) for power transfer and information exchange. This device is part of the electric vehicle coupler. For the purposes of this *Code*, the electric vehicle inlet is considered to be part of the electric vehicle and not part of the electric vehicle supply equipment.

Informational Note: For further information, see 625.48 for interactive systems.

Electric Vehicle Storage Battery.

A battery, comprised of one or more rechargeable electrochemical cells, that has no provision for the release of excessive gas pressure during normal charging and operation, or for the addition of water or electrolyte for external measurements of electrolyte-specific gravity.

Electric Vehicle Supply Equipment.

The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle.

Informational Note No. 1: For further information, see 625.48 for interactive systems.

Informational Note No. 2: Within this article, the terms *electric vehicle supply equipment* and *electric vehicle charging system equipment* are considered to be equivalent.

Fastened in Place.

Mounting means of an EVSE in which the fastening means are specifically designed to permit periodic removal for relocation, interchangeability, maintenance, or repair without the use of a tool.

Fixed in Place.

Mounting means of an EVSE attached to a wall or surface with fasteners that require a tool to be removed.

Output Cable to the Electric Vehicle.

An assembly consisting of a length of flexible EV cable and an electric vehicle connector (supplying power to the electric vehicle).

Output Cable to the Primary Pad.

A multi-conductor, shielded cable assembly consisting of conductors to carry the high-frequency energy and any status signals between the charger power converter and the primary pad.

Personnel Protection System.

A system of personnel protection devices and constructional features that when used together provide protection against electric shock of personnel.

Plug-In Hybrid Electric Vehicle (PHEV).

A type of electric vehicle intended for on-road use with the ability to store and use off-vehicle electrical energy in the rechargeable energy storage system, and having a second source of motive power.

Portable (as applied to EVSE).

A device intended for indoor or outdoor use that can be carried from charging location to charging location and is designed to be transported in the vehicle when not in use.

Power-Supply Cord.

An assembly consisting of an attachment plug and length of flexible cord that connects equipment to a receptacle.

Primary Pad.

A device external to the EV that provides power via the contactless coupling and may include the charger power converter.

Rechargeable Energy Storage System.

Any power source that has the capability to be charged and discharged.

> Informational Note: Batteries, capacitors, and electromechanical flywheels are examples of rechargeable energy storage systems.

Wireless Power Transfer (WPT).

The transfer of electrical energy from a power source to an electrical load via electric and magnetic fields or waves by a contactless inductive means between a primary and a secondary device.

Wireless Power Transfer Equipment (WPTE).

Equipment consisting of a charger power converter and a primary pad. The two devices are either separate units or contained within one enclosure.

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of task group appointed by the NEC Correlating Committee. This task group was appointed to identify potential issues in the NEC with respect to how definitions in both Article 100 and the XXX.2 sections of this Code apply. The member of the task group are: David Hittinger, Rich Holub, Chris Hunter, Dave Williams, Chris Porter, Alan Manche, Ken Boyce, John Kovacik, Donny Cook, Dave Kendall and Jim Dollard.

Section 2.2.2.1 of the NEC Style Manual requires that in general definitions that appear in two or more articles be located in Article 100. Section 2.2.2.2 requires that where an individual article contains definition(s), they be located in the second section (XXX.2) of the article. It is extremely important to note that the style manual does not prohibit a definition in the second section of an article from applying elsewhere in the NEC. The style manual clearly states that in general definitions that appear in two or more articles shall be located in Article 100. This has confused many code users in the past. This style manual requirement is accurate and these public inputs are simply an attempt to provide needed clarity. See the example below:

344.2 Definition.
Rigid Metal Conduit (RMC). A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.

The definition of the term "rigid metal conduit" is appropriately located in the article that contains general, installation and construction specifications for this raceway. It is commonly understood that the term "rigid metal conduit" is used in more than one article. There are many articles that contain a single definition that is necessary for application of the contained requirements but will apply elsewhere in the NEC. This occurs in articles that address cable assemblies, raceways, systems and more.
This public input seeks to delete the last sentence in the first paragraph, as it is unnecessary. A new sentence is proposed to simply inform the user of the code that definitions are also found in the second section (XXX.2) of other articles.
This public input is supplemented with proposed revisions to the second section (XXX.2) of articles that contain definitions. New parent text is proposed for these sections to increase clarity and usability. There are two different scenarios that will be addressed. First, any second section (XXX.2) that contains definitions that apply only within that article will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply only within this article.

Second, any second section (XXX.2) that contains definitions that apply within the individual article and throughout the code will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply within this article and throughout the code.

In a few cases, in the second section (XXX.2) of an Article there are definitions that will apply only in that Article and some that will apply in that Article and throughout the code. New parent text and first level subdivisions are proposed to achieve clarity and usability The combination of these proposed revisions will provide necessary clarity and usability with respect to application of definitions. These actions will also achieve compliance with the NEC Style Manual

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1202-NFPA 70-2017 [Article 100 [Excluding any Sub-Sections]]	

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Public Input No. 2445-NFPA 70-2017 [Definition: Electric Vehicle Supply Equipment.]

Electric Vehicle Supply Equipment (EVSE) .

The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the electric vehicle connectors, attachment plugs, personnel protection system, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle.

Informational Note No. 1: For further information, see 625.48 for interactive systems.

Informational Note No. 2: Within this article, the terms *electric vehicle supply equipment* and *electric vehicle charging system equipment* are considered to be equivalent.

Informational Note No.3: Electric vehicle power export equipment and electric vehicle supply equipment may be contained in one piece of equipment sometimes referred to as a bi-directional EVSE.

Statement of Problem and Substantiation for Public Input

Informational note 3 was added to clarify the three types of equipment included in the scope. Additionally, the initials “EVSE” were added after the term as this was omitted in previous code editions. This follows the same direction as using WPTE for wireless power transfer equipment and is considered an editorial change. Lastly, “personnel protection system” was added to the definition based on its required presence as indicated in 625.22.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2442-NFPA 70-2017 [Section No. 90.2(A)]	
Public Input No. 2443-NFPA 70-2017 [Section No. 625.1]	
Public Input No. 2444-NFPA 70-2017 [New Definition after Definition: Electric Vehicle Storage B...]	
Public Input No. 2446-NFPA 70-2017 [Section No. 625.5]	
Public Input No. 2448-NFPA 70-2017 [Section No. 625.16]	
Public Input No. 2449-NFPA 70-2017 [New Section after 625.40]	
Public Input No. 2452-NFPA 70-2017 [Section No. 625.41]	
Public Input No. 2454-NFPA 70-2017 [Section No. 625.43]	
Public Input No. 2455-NFPA 70-2017 [Section No. 625.44]	
Public Input No. 2456-NFPA 70-2017 [Section No. 625.48]	
Public Input No. 2458-NFPA 70-2017 [Article 625]	

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Public Input No. 441-NFPA 70-2017 [Definition: Electric Vehicle Supply Equipment.]

Electric Vehicle Supply Equipment (EVSE) .

The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle.

Informational Note No. 1: For further information, see 625.48 for interactive systems.

Informational Note No. 2: Within this article, the terms *electric vehicle supply equipment* and *electric vehicle charging system equipment* are considered to be equivalent.

Statement of Problem and Substantiation for Public Input

The abbreviation "EVSE" is used throughout this article, yet is never referred to in the definition.

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Public Input No. 608-NFPA 70-2017 [Definition: Electric Vehicle Supply Equipment.]

Electric Vehicle Supply Equipment. <u>(EVSE)</u>

The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle.

Informational Note No. 1: For further information, see 625.48 for interactive systems.

Informational Note No. 2: Within this article, the terms *electric vehicle supply equipment* and *electric vehicle charging system equipment* are considered to be equivalent.

Statement of Problem and Substantiation for Public Input

The acronym EVSE is used in the Article without first appearing in parentheses after the first use of the term. This is a requirement of section 3.2.3. NEC Style Manual.

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Public Input No. 2460-NFPA 70-2017 [Definition: Fastened in Place.]

Fastened in Place.

Mounting means ~~of an EVSE~~ of equipment in which the fastening means are specifically designed to permit periodic removal ~~for~~ , without the use of a tool, for relocation, interchangeability, maintenance, or repair ~~without the use of a tool~~ .

Statement of Problem and Substantiation for Public Input

The wording was revised to provide for better grammatical structure. The original sentence could be read that the actual “repair” was to be done without the use of a tool. Structuring the sentence this way indicates that the tool is not used to remove the fastening means regardless of why it is being removed.

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Public Input No. 2444-NFPA 70-2017 [New Definition after Definition: Electric Vehicle Storage B...]

New Definiton:

Electric Vehicle Power Export Equipment (EVPE). The equipment, including the outlet on the vehicle that is used to provide power to external loads using the vehicle as the source of supply.

Informational Note: Electric vehicle power export equipment and electric vehicle supply equipment may be contained in one piece of equipment, sometimes referred to as a bi-directional EVSE.

Statement of Problem and Substantiation for Public Input

Specific requirements in this Article call out EVSE (electrical vehicle supply equipment) and WPTE (wireless power transfer equipment) as needed, but where requirements are identical for both technologies, the word “equipment” was used in the 2017 edition of the Code. With the addition of EVPE (electric vehicle power export equipment), “equipment” can no longer be used as it would lead to confusion and misinterpretation of the requirements. The text needs to be clarified as to which requirements pertain to what type of equipment. A definition for the term EVPE is needed in order to utilize this term in the proposed changes in the companion proposals. This allows for EVSE and WPTE to be distinguished from EVPE. Informational note is included to clarify the three types of equipment included in the scope.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2442-NFPA 70-2017 [Section No. 90.2(A)]	
Public Input No. 2443-NFPA 70-2017 [Section No. 625.1]	
Public Input No. 2445-NFPA 70-2017 [Definition: Electric Vehicle Supply Equipment.]	
Public Input No. 2446-NFPA 70-2017 [Section No. 625.5]	
Public Input No. 2448-NFPA 70-2017 [Section No. 625.16]	
Public Input No. 2449-NFPA 70-2017 [New Section after 625.40]	
Public Input No. 2452-NFPA 70-2017 [Section No. 625.41]	
Public Input No. 2454-NFPA 70-2017 [Section No. 625.43]	
Public Input No. 2455-NFPA 70-2017 [Section No. 625.44]	
Public Input No. 2456-NFPA 70-2017 [Section No. 625.48]	
Public Input No. 2458-NFPA 70-2017 [Article 625]	

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Public Input No. 2449-NFPA 70-2017 [New Section after 625.40]

625.new Receptacle outlets used for EVPE.

Receptacles installed in electric vehicles, and intended to allow for connection of off board utilization equipment, shall compy with all of the following:

(A) **Type** . The recetacle outlet shall be a nonlocking, 2-pole, 3-wire, grounding-type receptacle.

(B) **Rating.** The receptacle outlet shall be rated 125 volts maximum, single phase 15 or 20 amperes.

(C) **Overcurrent Protection.** Electric vehicles provide with receptacle outlets for power export shall be provided with integral overcurrent protection. The overcurrent protection shall have a nominal rating sufficient for the receptacle it protects. The overcurrent protection shall also be sufficiently rated for the maximum available short circuit current at the receptacle and shall be included in the interactive equipment evaluation. Se 625.48.

(D) **GFCI Protection.** All recptacle outlets shall have ground-fault circuit-interrupt protection integral to the receptacle.

(E) **On Board Inverters.** The on board inverter intended to supply the receptacle shall be listed and included in the interactive equipment evaluation. See 625.48.

(F) **Marking.** The receptacle shall be marked with the maximum current rating of the receptacle. If more than one receptacle is provided, the group of receptalces shall be marked with the maximum current rating of each receptacle and the maximum current rating of the group of receptacles when used together. The marking shall be located where visible to the user when using the receptacle.

Statement of Problem and Substantiation for Public Input

This is a new paragraph added to address power export from the vehicle through a receptacle on board the vehicle. Receptacles installed on vehicles may be used for many different purposes, but are essentially a vehicle to load application for providing power to external utilization equipment. There are many potential hazards associated with these installations and temporary use of vehicle power for external utilization equipment, such as cut and abraded wire and cable, standing water and wet locations, and similar hazardous applications.

During these applications, persons who may not be familiar with adequate safety procedures may be using these receptacles, and requiring the receptacle to have integral GFCI protection will help eliminate the possibilities of shock hazards from damaged circuits, damaged equipment, or use of equipment in wet locations.

Further, rules that are applied to branch circuit receptacle outlets should also apply to vehicle receptacle outlets in as much as this Code can control. Utilization equipment plugging into a vehicle is intended for use on a branch circuit for which the code has many rules and requirements. These rules and requirements are factored into the listing of the utilization equipment. Abandoning those rules and requirements at the vehicle level could create conditions in which the risks and hazards of the utilization equipment are no longer effectively mitigated due to the power supply source application. These requirements attempt to control some of those aspects.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2442-NFPA 70-2017 [Section No. 90.2(A)]	
Public Input No. 2443-NFPA 70-2017 [Section No. 625.1]	
Public Input No. 2444-NFPA 70-2017 [New Definition after Definition: Electric Vehicle Storage B...]	
Public Input No. 2445-NFPA 70-2017 [Definition: Electric Vehicle Supply Equipment.]	
Public Input No. 2446-NFPA 70-2017 [Section No. 625.5]	
Public Input No. 2448-NFPA 70-2017 [Section No. 625.16]	
Public Input No. 2452-NFPA 70-2017 [Section No. 625.41]	
Public Input No. 2454-NFPA 70-2017 [Section No. 625.43]	
Public Input No. 2455-NFPA 70-2017 [Section No. 625.44]	
Public Input No. 2456-NFPA 70-2017 [Section No. 625.48]	

Public Input No. 2458-NFPA 70-2017 [Article 625]

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Public Input No. 2446-NFPA 70-2017 [Section No. 625.5]

625.5 Listed.

EVSE ~~or WPTE shall~~ , WPTE, and EVPE shall be listed.

Statement of Problem and Substantiation for Public Input

With the inclusion of EVPE, it is necessary to indicate that this equipment shall be listed the same as EVSE and WPTE.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2442-NFPA 70-2017 [Section No. 90.2(A)]	
Public Input No. 2443-NFPA 70-2017 [Section No. 625.1]	
Public Input No. 2444-NFPA 70-2017 [New Definition after Definition: Electric Vehicle Storage B...]	
Public Input No. 2445-NFPA 70-2017 [Definition: Electric Vehicle Supply Equipment.]	
Public Input No. 2448-NFPA 70-2017 [Section No. 625.16]	
Public Input No. 2449-NFPA 70-2017 [New Section after 625.40]	
Public Input No. 2452-NFPA 70-2017 [Section No. 625.41]	
Public Input No. 2454-NFPA 70-2017 [Section No. 625.43]	
Public Input No. 2455-NFPA 70-2017 [Section No. 625.44]	
Public Input No. 2456-NFPA 70-2017 [Section No. 625.48]	
Public Input No. 2458-NFPA 70-2017 [Article 625]	

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Public Input No. 2461-NFPA 70-2017 [Section No. 625.10]

~~**625.10** Electric Vehicle Coupler.~~

~~The electric vehicle coupler shall comply with 625.10(A) through (D).~~

~~**(A)** Construction and Installation.~~

~~The electric vehicle coupler shall be constructed and installed so as to guard against inadvertent contact by persons with parts made live from the electric vehicle supply equipment or the electric vehicle battery.~~

~~**(B)** Unintentional Disconnection.~~

~~The electric vehicle coupler shall be provided with a positive means to prevent unintentional disconnection.~~

~~**(C)** Grounding Pole.~~

~~The electric vehicle coupler shall be provided with a grounding pole, unless provided as part of a listed isolated electric vehicle supply equipment system.~~

~~**(D)** Grounding Pole Requirements.~~

~~If a grounding pole is provided, the electric vehicle coupler shall be so designed that the grounding pole connection is the first to make and the last to break contact.~~

Statement of Problem and Substantiation for Public Input

All of these requirements as outlined in 625.10 are design requirements that are meant to address the design of the coupler. These requirements were added to the code in 1996 when product standards did not exist. Since then, ANSI/UL 2251, which is also tri-nationally harmonized, has been published and has included all of these requirements since its first publication date in 1998. As 625.16 already requires the coupling means to be listed, there is no need to include design requirements in the installation code for this equipment. Further, burdening the AHJ with the need to verify these requirements which are already addressed by listing is unnecessary.

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Public Input No. 3642-NFPA 70-2017 [Section No. 625.10]

625.10 Electric Vehicle Coupler.

The electric vehicle coupler shall ~~comply with 625.10(A) through (D).~~

~~**(A)** Construction and Installation.~~

~~The electric vehicle coupler shall~~

be

~~constructed and installed so as to guard against inadvertent contact by persons with parts made live from the electric vehicle supply equipment or the electric vehicle battery.~~

~~**(B)** Unintentional Disconnection.~~

~~The electric vehicle coupler shall be provided with~~

a

~~positive means to prevent unintentional disconnection.~~

~~**(C)** Grounding Pole.~~

~~The electric vehicle coupler shall be provided with a grounding pole, unless provided as~~

part of

~~a listed isolated electric vehicle supply equipment system.~~

~~**(D)** Grounding Pole Requirements.~~

~~If a grounding pole is provided, the electric vehicle coupler shall be so designed that the grounding pole connection is the first to make and the last to break contact~~

the Listed EV Supply Equipment .

Statement of Problem and Substantiation for Public Input

The type of construction features being addressed here are evaluated as a part of the Listing certification program. As a part of the certification for Listing every Electric Vehicle Coupler (both connector and inlet) is required to meet the requirements of UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles. This Standard provides the requirements covering plugs, receptacles, vehicle inlets, vehicle connectors, and breakaway couplings, rated up to 800 amperes and up to 600 volts ac or dc, intended for conductive connection systems, for use with electric vehicles. These devices are for use in either indoor or outdoor nonhazardous locations in accordance with Annex A, Ref. No. 1 (ANSI/NFPA 70 National Electrical Code (NEC)).

The EV coupler is then further evaluated as a part of the EV Charging or Supply Equipment.

The methods for compliance involve evaluation and test of certain internal constructions, components and other features that the AHJ cannot inspect or examine in the field.

These requirement are evaluated during the certification (Listing) of the product, first for compliance with the requirements of UL 2251 , then for UL 2202 and/or UL 2594, as aappropriate. Listed products complying with UL 2202 or UL 2594 and UL 2251 meet the following requirements:

For 625.10(A)
From UL 2251:
10 Enclosures
10.1.1 An enclosure shall be constructed so as to reduce the risk of unintentional contact with uninsulated live parts, see 13.1, and to provide internal parts with protection from specified external conditions.
13 Accessibility of Live Parts
13.1 To reduce the likelihood of unintentional contact that could involve a risk of electric shock from uninsulated live parts, a live part shall not be contacted by the probe illustrated in Figure 1 (UL Articulate probe). See 13.5.

13.5 Mating devices shall not have exposed live contacts when fully mated or during engagement or withdrawal. Mating devices provided with a shroud to cover the contacts shall be examined to determine that the shroud enters the mating device before the contacts become energized.

For 625.10(B) and (C)
14 Grounding
14.1 A device (i.e. vehicle coupler) intended for use on a grounded system shall be of a grounding type and shall have a separate contact for interconnection of the equipment grounding conductor. A device intended for use on an isolated system shall comply with (clause) Isolation, 16, and this Clause shall not apply to that type of device.
14.6 The grounding contact shall be located and formed so that the path of electrical continuity to the grounding contact of the plug or vehicle connector and its mating device, or between halves of a breakaway coupling, is completed before continuity is established between any other contact and its respective contact on the mating device.
16 Isolation
16.1 A device intended for use on an isolated system shall comply with 16.2. A device intended for use on a grounded system need not comply with these requirements, but rather shall comply with Grounding, 14.
16.2 No protective earth ground is required. A functional earth, or reference earth, conductor used to monitor the isolation of the vehicle frame from the source voltage is required. The conductor shall be suitably sized for the application.

For 625.10(D)
37.1 Plugs and receptacles, vehicle connectors, and vehicle inlets
37.1.1 The pressure exerted by mating contacts of a plug with a receptacle, or an vehicle inlet with a vehicle connector, shall not be so great as to prevent easy insertion and withdrawal of the plug or vehicle connector, but sufficient to keep it from working out of the mating device in normal use. The force required to insert and withdraw the plug or vehicle connector into or from its mating part shall be measured. The force required to withdraw the plug or vehicle connector from its mating device shall be less than the force required to insert it. In addition, for plugs and vehicle connectors that do not meet the requirements in (a) – (c), the withdrawal force shall be greater than the minimum withdrawal forces shown in Table 10:
a) The plug or vehicle connector is of the delayed action type;
b) The plug or vehicle connector is of the interlocked type; or
c) The plug or vehicle connector is provided with a latch.

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Public Input No. 2994-NFPA 70-2017 [Section No. 625.10(A)]

~~**(A)** Construction and Installation.~~

~~The electric vehicle coupler shall be constructed and installed so as to guard against inadvertent contact by persons with parts made live from the electric vehicle supply equipment or the electric vehicle battery.~~

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 1/1 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

The electric vehicle coupler requirements for enclosures and accessibility of live parts are covered in the Standard for Plugs, Receptacles, and Couplers for Electric Vehicles, ANSI/UL 2251, Sub-clause 10.1.1, 10.2.1 and Sub-clause 13.1, respectively.

(For reference, text from ANSI/UL 2251):
10.1.1 An enclosure shall be constructed so as to reduce the risk of unintentional contact with uninsulated live parts, see 13.1, and to provide internal parts with protection from specified external conditions.

10.2.1 An enclosure shall have adequate strength and rigidity for its intended use. It shall not permit any increase in shock or fire hazard due to total or partial collapse with resulting reduction in spacings, loosening, or displacement of parts, or other serious defects. See the Impact Test, 34, the Crush Test, 35, and the Vehicle Drive Over Test, 36.

13.1 To reduce the likelihood of unintentional contact that could involve a risk of electric shock from uninsulated live parts, a live part shall not be contacted by the probe illustrated in Figure 1. See 13.5.

Listed EVSE are in compliance with the requirement in Clause 13.1 of ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment which requires the incorporation of vehicle couplers in compliance with the requirements of ANSI/UL 2251.

(For reference, text from ANSI/UL 2202):
13.1 A receptacle plug, vehicle connector, or vehicle inlet shall comply with the requirements in the proposed Standard for Safety for Plugs, Receptacles, and Couplers for Electric Vehicles, UL 2251.

Submitter Note: ANSI/UL 2251 is no longer “proposed” as it is currently in its published third edition.

Listed EVSE are in compliance with the requirements of Clauses 13.1.2(a), 13.1.11 and 13.1.12 of ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment which requires the incorporation of electric vehicle couplers in compliance with the requirements of ANSI/UL 2251. ANSI/UL 2251 is the Standard associated with the references to Annex A, Ref. No. 5 in the requirements below.

(For reference, text from ANSI/UL 2594):
13.1.2 The EV supply equipment shall be provided with one of the following means at the output:

(a) An EV receptacle in accordance with Annex A, Ref. No. 5.

13.1.11 For EV cables intended to connect to an EV receptacle located on the EV supply equipment, the EV cable shall terminate in an EV plug on the EV supply equipment side. The EV plug shall comply with the applicable requirements in Annex A, Ref. No. 5. The EV plug shall be designed in accordance with the standardized interface outlined in Annex A, Ref. No. 29 or the connection and the interface shall be evaluated based upon possible misconnection and shall be marked in accordance with 74.14.

13.1.12 For EV cables provided for the connection of the vehicle to the EV supply equipment, the EV cable shall terminate on the vehicle side of the cable in an EV connector. The EV connector shall comply with the applicable requirements in Annex A, Ref. No. 5. The EV connector shall be designed in accordance with the standardized interface outlined in Annex A, Ref. No. 29 or the connection and interface shall be evaluated based on possible misconnection and shall be marked in accordance with 74.14.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL “White Book” under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
  - o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
  - o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
  - o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
  - o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
  - o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: “Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL’s Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations.”
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ,

Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL's Standards may be made by any interested party using UL's on-line Collaborative Standards Development System (CSDS)

- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory
- The Informational Note in Section 110.3(C) provides reference to OSHA's Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL's Electrical Connections (a supplement to The Code Authority), dated November 2010:

"Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625."

For simplicity, references to UL's programs for Listing have been noted. Similar programs are available from all NRTL's. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

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Submittal Date:	Wed Aug 30 13:42:17 EDT 2017

Public Input No. 3356-NFPA 70-2017 [Section No. 625.10(B)]

~~**(B)** Unintentional Disconnection.~~

~~The electric vehicle coupler shall be provided with a positive means to prevent unintentional disconnection.~~

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 2/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

The electric vehicle coupler requirement for unintentional disconnection is covered in Clause 37.1.1 of ANSI/UL 2251. For design flexibility, this Standard offers three construction options in addition to a test option (Withdrawal Force Test) to meet the intent of the prevention of unintentional disconnection.

(For reference, text from ANSI/UL 2251):
37.1.1 The pressure exerted by mating contacts of a plug with a receptacle, or an vehicle inlet with a vehicle connector, shall not be so great as to prevent easy insertion and withdrawal of the plug or vehicle connector, but sufficient to keep it from working out of the mating device in normal use. The force required to insert and withdraw the plug or vehicle connector into or from its mating part shall be measured. The force required to withdraw the plug or vehicle connector from its mating device shall be less than the force required to insert it. In addition, for plugs and vehicle connectors that do not meet the requirements in (a) – (c), the withdrawal force shall be greater than the minimum withdrawal forces shown in Table 10.

(a) The plug or vehicle connector is of the delayed action type;
(b) The plug or vehicle connector is of the interlocked type; or
(c) The plug or vehicle connector is provided with a latch. (End of Clause 37.1.1)

Listed EVSE are in compliance with the requirement in Clause 13.1 of ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment which requires the incorporation of vehicle couplers in compliance with the requirements of ANSI/UL 2251.

(For reference, text from ANSI/UL 2202):
13.1 A receptacle plug, vehicle connector, or vehicle inlet shall comply with the requirements in the proposed Standard for Safety for Plugs, Receptacles, and Couplers for Electric Vehicles, UL 2251.

Submitter Note: ANSI/UL 2251 is no longer “proposed” as it is currently in its published third edition.

Listed EVSE are in compliance with the requirements of Clauses 13.1.2(a), 13.1.11 and 13.1.12 of ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment which requires the incorporation of electric vehicle couplers in compliance with the requirements of ANSI/UL 2251. ANSI/UL 2251 is the Standard associated with the references to Annex A, Ref. No. 5 in the requirements below.

(For reference, text from ANSI/UL 2594):
13.1.2 The EV supply equipment shall be provided with one of the following means at the output:

(a) An EV receptacle in accordance with Annex A, Ref. No. 5.

13.1.11 For EV cables intended to connect to an EV receptacle located on the EV supply equipment, the EV cable shall terminate in an EV plug on the EV supply equipment side. The EV plug shall comply with the applicable requirements in Annex A, Ref. No. 5. The EV plug shall be designed in accordance with the standardized interface outlined in Annex A, Ref. No. 29 or the connection and the interface shall be evaluated based upon possible misconnection and shall be marked in accordance with 74.14.

13.1.12 For EV cables provided for the connection of the vehicle to the EV supply equipment, the EV cable shall terminate on the vehicle side of the cable in an EV connector. The EV connector shall comply with the applicable requirements in Annex A, Ref. No. 5. The EV connector shall be designed in accordance with the standardized interface outlined in Annex A, Ref. No. 29 or the connection and interface shall be evaluated based on possible misconnection and shall be marked in accordance with 74.14.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL “White Book” under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
  - o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
  - o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
  - o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
  - o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
  - o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: “Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL’s Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations.”
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists

of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL's Standards may be made by any interested party using UL's on-line Collaborative Standards Development System (CSDS)

- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory
- The Informational Note in Section 110.3(C) provides reference to OSHA's Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL's Electrical Connections (a supplement of The Code Authority), dated November 2010:

"Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625."

For simplicity, references to UL's programs for Listing have been noted. Similar programs are available from all NRTL's. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2994-NFPA 70-2017 [Section No. 625.10(A)]	

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Public Input No. 3359-NFPA 70-2017 [Section No. 625.10(C)]

~~**(C)** Grounding Pole.~~

~~The electric vehicle coupler shall be provided with a grounding pole, unless provided as part of a listed isolated electric vehicle supply equipment system.~~

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 3/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

The electric vehicle coupler requirement for provision of a grounding pole is covered in ANSI/UL 2251, the Standard for Plugs, Receptacles, and Couplers for Electric Vehicles, Clause 14.1.

(For reference, text from ANSI/UL 2251):
14.1 A device intended for use on a grounded system shall be of a grounding type and shall have a separate contact for interconnection of the equipment grounding conductor. A device intended for use on an isolated system shall comply with Isolation, 16, and this Clause shall not apply to that type of device.

Listed EVSE are in compliance with the requirement in Clause 13.1 of ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment which requires the incorporation of vehicle couplers in compliance with the requirements of ANSI/UL 2251.

(For reference, text from ANSI/UL 2202):
13.1 A receptacle plug, vehicle connector, or vehicle inlet shall comply with the requirements in the proposed Standard for Safety for Plugs, Receptacles, and Couplers for Electric Vehicles, UL 2251.

Submitter Note: ANSI/UL 2251 is no longer “proposed” as it is currently in its published third edition.

Listed EVSE are in compliance with the requirements of Clauses 13.1.2(a), 13.1.11 and 13.1.12 of ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment which requires the incorporation of electric vehicle couplers in compliance with the requirements of ANSI/UL 2251. ANSI/UL 2251 is the Standard associated with the references to Annex A, Ref. No. 5 in the requirements below.

(For reference, text from ANSI/UL 2594):
13.1.2 The EV supply equipment shall be provided with one of the following means at the output:

(a) An EV receptacle in accordance with Annex A, Ref. No. 5.

13.1.11 For EV cables intended to connect to an EV receptacle located on the EV supply equipment, the EV cable shall terminate in an EV plug on the EV supply equipment side. The EV plug shall comply with the applicable requirements in Annex A, Ref. No. 5. The EV plug shall be designed in accordance with the standardized interface outlined in Annex A, Ref. No. 29 or the connection and the interface shall be evaluated based upon possible misconnection and shall be marked in accordance with 74.14.

13.1.12 For EV cables provided for the connection of the vehicle to the EV supply equipment, the EV cable shall terminate on the vehicle side of the cable in an EV connector. The EV connector shall comply with the applicable requirements in Annex A, Ref. No. 5. The EV connector shall be designed in accordance with the standardized interface outlined in Annex A, Ref. No. 29 or the connection and interface shall be evaluated based on possible misconnection and shall be marked in accordance with 74.14.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL “White Book” under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
  - o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
  - o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
  - o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
  - o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
  - o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: “Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL’s Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations.”
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL’s Standards may be made by any interested party using UL’s on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory

- The Informational Note in Section 110.3(C) provides reference to OSHA's Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL's Electrical Connections (a supplement of The Code Authority), dated November 2010:

"Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625."

For simplicity, references to UL's programs for Listing have been noted. Similar programs are available from all NRTL's. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3356-NFPA 70-2017 [Section No. 625.10(B)]	

Submitter Information Verification

Submitter Full Name: Craig Sato
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Submittal Date: Tue Sep 05 16:55:04 EDT 2017

Public Input No. 3361-NFPA 70-2017 [Section No. 625.10(D)]

~~**(D)** Grounding Pole Requirements.~~

~~If a grounding pole is provided, the electric vehicle coupler shall be so designed that the grounding pole connection is the first to make and the last to break contact.~~

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 4/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

The electric vehicle coupler requirement for the grounding pole to make first and break last is covered in Clause 14.6 of ANSI/UL 2251, the Standard for Plugs, Receptacles, and Couplers for Electric Vehicles.

(For reference, text from ANSI/UL 2251):
14.6 The grounding contact shall be located and formed so that the path of electrical continuity to the grounding contact of the plug or vehicle connector and its mating device, or between halves of a breakaway coupling, is completed before continuity is established between any other contact and its respective contact on the mating surface.

Listed EVSE are in compliance with the requirement in Clause 13.1 of ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment which requires the incorporation of vehicle couplers in compliance with the requirements of ANSI/UL 2251.

(For reference, text from ANSI/UL 2202):
13.1 A receptacle plug, vehicle connector, or vehicle inlet shall comply with the requirements in the proposed Standard for Safety for Plugs, Receptacles, and Couplers for Electric Vehicles, UL 2251.

Submitter Note: ANSI/UL 2251 is no longer “proposed” as it is currently in its published third edition.

Listed EVSE are in compliance with the requirements of Clauses 13.1.2(a), 13.1.11 and 13.1.12 of ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment which requires the incorporation of electric vehicle couplers in compliance with the requirements of ANSI/UL 2251. ANSI/UL 2251 is the Standard associated with the references to Annex A, Ref. No. 5 in the requirements below.

(For reference, text from ANSI/UL 2594):
13.1.2 The EV supply equipment shall be provided with one of the following means at the output:

(a) An EV receptacle in accordance with Annex A, Ref. No. 5.

13.1.11 For EV cables intended to connect to an EV receptacle located on the EV supply equipment, the EV cable shall terminate in an EV plug on the EV supply equipment side. The EV plug shall comply with the applicable requirements in Annex A, Ref. No. 5. The EV plug shall be designed in accordance with the standardized interface outlined in Annex A, Ref. No. 29 or the connection and the interface shall be evaluated based upon possible misconnection and shall be marked in accordance with 74.14.

13.1.12 For EV cables provided for the connection of the vehicle to the EV supply equipment, the EV cable shall terminate on the vehicle side of the cable in an EV connector. The EV connector shall comply with the applicable requirements in Annex A, Ref. No. 5. The EV connector shall be designed in accordance with the standardized interface outlined in Annex A, Ref. No. 29 or the connection and interface shall be evaluated based on possible misconnection and shall be marked in accordance with 74.14.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL “White Book” under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
  - o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
  - o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
  - o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
  - o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
  - o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: “Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL’s Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations.”
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL’s Standards may be made by any interested party using UL’s on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory

- The Informational Note in Section 110.3(C) provides reference to OSHA's Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL's Electrical Connections (a supplement of The Code Authority), dated November 2010:

"Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625."

For simplicity, references to UL's programs for Listing have been noted. Similar programs are available from all NRTL's. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3359-NFPA 70-2017 [Section No. 625.10(C)]	

Submitter Information Verification

Submitter Full Name: Craig Sato
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Submittal Date: Tue Sep 05 16:59:42 EDT 2017

Public Input No. 3364-NFPA 70-2017 [Section No. 625.15(A)]

~~**(A)** General.~~

~~All equipment shall be marked by the manufacturer as follows:~~

~~FOR USE WITH ELECTRIC VEHICLES~~

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 5/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

Listed EVSE are in compliance with the requirements in ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment, and are required to bear the General marking covered in (A). The wording of this General marking is covered in Clause 72.3.

(For reference, text from ANSI/UL 2594):
72.3 All EV supply equipment shall be marked with the words "For use with Electric Vehicles." This marking shall be visible during intended use.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL "White Book" under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in

Informative Annex A (ref. Section 90.7, Informational Note No. 3)

o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment

o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment

o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements

o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems

o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles

- From the UL website: “Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL’s Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations.”
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL’s Standards may be made by any interested party using UL’s on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory
- The Informational Note in Section 110.3(C) provides reference to OSHA’s Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL’s Electrical Connections (a supplement of The Code Authority), dated November 2010:

“Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625.”

For simplicity, references to UL’s programs for Listing have been noted. Similar programs are available from all NRTL’s. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL’s titled “A Seller’s Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States” that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3361-NFPA 70-2017 [Section No. 625.10(D)]	

Submitter Information Verification

Submitter Full Name: Craig Sato
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Submittal Date: Tue Sep 05 17:04:50 EDT 2017

Copyright Assignment

I, Craig Sato, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

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Public Input No. 3366-NFPA 70-2017 [Section No. 625.15(B)]

~~**(B)** Ventilation Not Required.~~

~~Where marking is required by 625.52(A) , the equipment shall be clearly marked by the manufacturer as follows:~~

~~VENTILATION NOT REQUIRED~~

~~The marking shall be located so as to be clearly visible after installation.~~

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 6/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

Listed EVSE complying with either ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment, or ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment, are required to bear the marking covered in Section 625.15(B).

The Scope of ANSI/UL 2594 indicates coverage of EVSE intended only for use where ventilation is not required. The Ventilation Not Required marking is specified in Clause 72.4 of this Standard.

(For reference, text from ANSI/UL 2594):
72.4 All EV supply equipment shall be marked with the words “Ventilation Not Required.” This marking shall be visible during normal use.

Listed EVSE complying with ANSI/UL 2202 evaluated for use with EV's not requiring ventilation during charging are required to be marked, as follows, according to Clause 74.3.18.

(For reference, text from ANSI/UL 2202):
74.3.18 A fixed unit not provided with external connections for a ventilating means specified in 13.6 shall be marked with the word "WARNING" and the following or equivalent: "This equipment is not intended for indoor charging of vehicles requiring ventilation during charging." A fixed unit intended to charge only vehicles not requiring ventilation during charging shall be marked this way or alternatively marked with the word "WARNING" and the following or the equivalent: "This equipment is intended only for charging vehicles not requiring ventilation during charging."

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL "White Book" under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
  - ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
  - ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
  - ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
  - ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
  - ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: "Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL's Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations."
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL's Standards may be made by any interested party using UL's on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory
- The Informational Note in Section 110.3(C) provides reference to OSHA's Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL's Electrical Connections (a supplement of The Code Authority), dated November 2010:

"Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in

compliance with all safety requirements of NEC Article 625."

For simplicity, references to UL's programs for Listing have been noted. Similar programs are available from all NRTL's. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3364-NFPA 70-2017 [Section No. 625.15(A)]	

Submitter Information Verification

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Submittal Date:	Tue Sep 05 17:09:43 EDT 2017

Public Input No. 3369-NFPA 70-2017 [Section No. 625.15(C)]

~~**(C)** Ventilation Required.~~

~~Where marking is required by 625.52(B) , the equipment shall be clearly marked by the manufacturer, "Ventilation Required." The marking shall be located so as to be clearly visible after installation.~~

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 7/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

Stationary (fixed) and portable Listed EVSE complying with ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment, and evaluated for use with EV's requiring ventilation during charging are marked as follows according to Clauses 74.3.19 and 74.3.20 of this Standard.

(For reference, text from ANSI/UL 2202):
74.3.19 A fixed unit not provided with external connections for a ventilating means specified in 13.6 shall be marked with the word "WARNING" and the following or equivalent: "Proper Ventilation is required to reduce the Risk of Hazardous or Explosive gas build up during indoor charging. See Owners Manual."

74.3.20 A portable unit shall be marked with the word "WARNING" and the following or equivalent: "Proper Ventilation is required to reduce the Risk of Hazardous or Explosive gas build up during indoor charging. See Owners Manual."

The Scope of ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment, indicates coverage of EVSE intended only for use where ventilation is not required. In this case, the Ventilation Not Required marking is specified in Clause 72.4 of this Standard.

(For reference, text from ANSI/UL 2594):
72.4 All EV supply equipment shall be marked with the words “Ventilation Not Required.” This marking shall be visible during normal use.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL “White Book” under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
  - o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
  - o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
  - o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
  - o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
  - o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: “Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL’s Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations.”
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL’s Standards may be made by any interested party using UL’s on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory
- The Informational Note in Section 110.3(C) provides reference to OSHA’s Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL’s Electrical Connections (a supplement of The Code Authority), dated November 2010:

“Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625.”

For simplicity, references to UL’s programs for Listing have been noted. Similar programs are available from all NRTL’s. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by

Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3366-NFPA 70-2017 [Section No. 625.15(B)]	

Submitter Information Verification

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Public Input No. 2448-NFPA 70-2017 [Section No. 625.16]

625.16 Means of Coupling.

The means of coupling ~~to~~ equipment to the electric vehicle ~~shall~~ during charging shall be conductive, inductive, or wireless power transfer. ~~Attachment plugs, electric vehicle connectors, and electric vehicle inlets shall be~~ The means of coupling equipment to the electric vehicle during power export shall be conductive. The coupling means shall be listed or labeled for the purpose.

Statement of Problem and Substantiation for Public Input

The changes are predicated on the addition of electric vehicle power export equipment to Article 625. Utilizing power from the vehicle is to be allowed through conductive connection only until the proper research and application is determined for bidirectional wireless power transfer. Additionally, reference to plugs, connectors and inlets is no longer accurate as the WPTE system will use primary coils and vehicle coils. All means of coupling should be certified based on intended use, not just the three indicated.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2442-NFPA 70-2017 [Section No. 90.2(A)]	
Public Input No. 2443-NFPA 70-2017 [Section No. 625.1]	
Public Input No. 2444-NFPA 70-2017 [New Definition after Definition: Electric Vehicle Storage B...]	
Public Input No. 2445-NFPA 70-2017 [Definition: Electric Vehicle Supply Equipment.]	
Public Input No. 2446-NFPA 70-2017 [Section No. 625.5]	
Public Input No. 2449-NFPA 70-2017 [New Section after 625.40]	
Public Input No. 2452-NFPA 70-2017 [Section No. 625.41]	
Public Input No. 2454-NFPA 70-2017 [Section No. 625.43]	
Public Input No. 2455-NFPA 70-2017 [Section No. 625.44]	
Public Input No. 2456-NFPA 70-2017 [Section No. 625.48]	
Public Input No. 2458-NFPA 70-2017 [Article 625]	

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Public Input No. 3372-NFPA 70-2017 [Section No. 625.16]

~~**625.16** Means of Coupling.~~

~~The means of coupling to the electric vehicle shall be conductive, inductive, or wireless power transfer. Attachment plugs, electric vehicle connectors, and electric vehicle inlets shall be listed or labeled for the purpose.~~

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 8/23 of a set of PI’s intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

Conductive means of coupling are covered under ANSI/UL 2251, the Standard for Plugs, Receptacles, and Couplers for Electric Vehicles. Couplers evaluated using this Standard are labeled as UL Recognized Components and may be found within UL’s “Yellow Book” under Guide FFVI2.

The general statement that the means of coupling shall be conductive, inductive or wireless power transfer is redundant as it is already covered in the Scope, Section 625.1.

Listed EVSE meet the requirement in Clause 13.1 of ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment which requires the incorporation of vehicle couplers in compliance with the requirements of ANSI/UL 2251.

(For reference, text from ANSI/UL 2202):
13.1 A receptacle plug, vehicle connector, or vehicle inlet shall comply with the requirements in the proposed Standard for Safety for Plugs, Receptacles, and Couplers for Electric Vehicles, UL 2251.

Submitter Note: ANSI/UL 2251 is no longer “proposed” as it is currently in its published third edition.

Listed EVSE meet the requirements of Clauses 13.1.2(a), 13.1.11 and 13.1.12 of ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment which requires the incorporation of electric vehicle couplers in compliance with the requirements of ANSI/UL 2251. ANSI/UL 2251 is the Standard associated with the references to Annex A, Ref. No. 5 in the requirements below.

(For reference, text from ANSI/UL 2594):
13.1.2 The EV supply equipment shall be provided with one of the following means at the output:

(a) An EV receptacle in accordance with Annex A, Ref. No. 5.

13.1.11 For EV cables intended to connect to an EV receptacle located on the EV supply equipment, the EV cable shall terminate in an EV plug on the EV supply equipment side. The EV plug shall comply with the applicable requirements in Annex A, Ref. No. 5. The EV plug shall be designed in accordance with the standardized interface outlined in Annex A, Ref. No. 29 or the connection and the interface shall be evaluated based upon possible misconnection and shall be marked in accordance with 74.14.

13.1.12 For EV cables provided for the connection of the vehicle to the EV supply equipment, the EV cable shall terminate on the vehicle side of the cable in an EV connector. The EV connector shall comply with the applicable requirements in Annex A, Ref. No. 5. The EV connector shall be designed in accordance with the standardized interface outlined in Annex A, Ref. No. 29 or the connection and interface shall be evaluated based on possible misconnection and shall be marked in accordance with 74.14.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL “White Book” under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: “Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL’s Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations.”
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL’s Standards may be made by any interested party using UL’s on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory

- The Informational Note in Section 110.3(C) provides reference to OSHA's Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL's Electrical Connections (a supplement of The Code Authority), dated November 2010:

"Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625."

For simplicity, references to UL's programs for Listing have been noted. Similar programs are available from all NRTL's. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3369-NFPA 70-2017 [Section No. 625.15(C)]	

Submitter Information Verification

Submitter Full Name: Craig Sato
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Submittal Date: Tue Sep 05 17:28:21 EDT 2017

Public Input No. 2462-NFPA 70-2017 [Section No. 625.17(A)]

(A) Power-Supply Cord.

The cable for cord-connected equipment shall comply with all of the following:

(1) Be any of the types specified in 625.17(B)(1) or hard service cord, junior hard service cord, or portable power cable types in accordance with Table 400.4. Hard service cord, junior hard service cord, or portable power cable types shall be listed, as applicable, for exposure to oil and damp and wet locations.

(2) Have an ampacity as specified in Table 400.5(A)(1) or, for 8 AWG and larger, in the 60°C columns of Table 400.5(A)(2).

(3) Have an overall length as specified in 625.17(A)(3)a. or b as follows:

(4) When the interrupting device of the personnel protection system specified in 625.22 is located within the enclosure of the supply equipment or charging system, the power-supply cord shall be not more

~~than 300 mm (12 in.) long,~~

a. than the length indicated in (i) or (ii):

(i) For portable equipment in accordance with 625.44(A), the power supply cord shall be not more than 300 mm (12 inches) long,

(ii) For stationary equipment in accordance with 625.44(B), the power supply cord shall be not more than 1.8 m (6 feet) long and the equipment shall be installed at a height that prevents the power supply cord from contacting the floor when it is connected to the proper receptacle.

a. When the interrupting device of the personnel protection system specified in 625.22 is located at the attachment plug, or within the first 300 mm (12 in.) of the power-supply cord, the overall cord length shall

~~be a minimum of 1.8 m (6 ft) and shall be not~~

a. be not greater than 4.6 m (15 ft).

Statement of Problem and Substantiation for Public Input

It item (A)(1), an editorial change is needed to correlate to the public input related to 625.17(B).

The rationale for the maximum cord length on EVSE is that the cord could be subjected to abuse in a vehicle parking area that could damage the power supply cord; and any damaged cord prior to the interrupting device would remain live after the interrupting device was to open. With this in mind, a maximum of 12 inches was assigned as the suitable cord length for unprotected cord such that hazards would be mitigated due to the probability of damage occurring to the initial 12 inches of cord length. The concept was that the first 12 inches of the cord length would be off the floor due to plugging into a receptacle and that the possibility and frequency of damage to the portion of the cord off the floor and against the wall was considered to be reduced to an acceptable level. Therefore, when the interrupting device is located in the EVSE enclosure, the power cord is limited to 12 inches based on this rationale.

Expanding on this same concept and rationale, if the EVSE is fastened in place on the wall in a manner (height, location, etc.) that will keep the power supply cord off the floor when it is plugged in and the EVSE is being used, we would be addressing the risk of damage to the power supply cord prior to the interrupting device in the same manner as the argument for 12 inches above. However, additional controls such as fastening in place of the EVSE and requiring the cord length to be of an overall length that would allow it to be suspended and not touch the floor, would relax the need to control the power supply cord to 12 inches.

In this manner, fastened in place EVSE could have a 6 foot power supply cord without any increased risk to the user due to damage on the unprotected length of power cord.

It should be noted that this construction and installation is allowed in almost every location on the globe, including

Canada which shares the product safety standard for this equipment (harmonized UL 2594/CSA C22.2 No. 280). That standard has specific requirements for installation instructions that are used to control parameters such as height of EVSE installation, location of receptacle, and keeping the power cord from contacting the floor.

Lastly, as this construction and installation is already allowed globally, EVSE with a 6 foot cord has been in use for almost 10 years with no indication of incidents due to damage to the supply cord.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2464-NFPA 70-2017 [Section No. 625.17(B)]	PI that requires editorial change in 625.17(A)(1).

Submitter Information Verification

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Submittal Date: Fri Aug 18 14:07:04 EDT 2017

Public Input No. 3373-NFPA 70-2017 [Section No. 625.17(A)]

~~**(A)** Power-Supply Cord.~~

~~The cable for cord-connected equipment shall comply with all of the following:~~

- ~~Be any of the types specified in 625.17(B) or hard service cord, junior hard service cord, or portable power cable types in accordance with Table 400.4 . Hard service cord, junior hard service cord, or portable power cable types shall be listed, as applicable, for exposure to oil and damp and wet locations.~~

(1) Have an ampacity as specified in Table 400.5(A)(1) or, for 8 AWG and larger, in the 60°C columns of Table 400.5(A)(2) .

(2) Have an overall length as specified in 625.17(A)(3)a. or b as follows:

(3) When the interrupting device of the personnel protection system specified in 625.22 is located within the enclosure of the supply equipment or charging system, the power-supply cord shall be not more than 300 mm (12 in.) long,

(4) When the interrupting device of the personnel protection system specified in 625.22 is located at the attachment plug, or within the first 300 mm (12 in.) of the power-supply cord, the overall cord length shall be a minimum of 1.8 m (6 ft) and shall be not greater than 4.6 m (15 ft).

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 9/23 of a set of PI’s intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

Cord-connected, Listed EVSE are in compliance with either ANSI/UL 2594, the Standard for Electric Vehicle Supply Equipment, (Ref. Clause 12.2.1.2) or ANSI/UL 2202, the Standard for Electric Vehicle (EV) Charging System Equipment, (Ref. Clause 11.4.2.1) and are required to use one of the following Listed power supply cord (UL White Book, Guide ELBZ) Types: G, SEO, SO, STO, SJEO, SJO, SJTO, or W, or a cord that is equally serviceable.

(For reference, text from ANSI/UL 2594):
12.2.1.2 The cord shall be Type G, SEO, SO, STO, SJEO, SJO, SJTO, or W, or a cord that is equally serviceable. The flexible power cord shall terminate at the enclosure of the device. The overall length of the power cord shall comply with one of the following. The overall length of the power cord is measured from the face of the attachment plug to the point where it enters the enclosure.

(For reference, text from ANSI/UL 2202):
11.4.2.1 The cord shall be Type G, SEO, SO, STO, SJEO, SJO, SJTO, W, or a cord that is equally serviceable. The length of the cord used for the alternating current input circuit as measured from the face of the attachment plug to the point where the cord emerges from the unit shall not be less than 6 feet (1.8 m).

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL “White Book” under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: “Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL’s Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations.”
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL’s Standards may be made by any interested party using UL’s on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory
- The Informational Note in Section 110.3(C) provides reference to OSHA’s Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL’s Electrical Connections (a supplement of The Code Authority), dated November 2010:

“Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625.”

For simplicity, references to UL’s programs for Listing have been noted. Similar programs are available from all NRTL’s. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL’s titled “A Seller’s Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States” that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3372-NFPA 70-2017 [Section No. 625.16]	

Submitter Information Verification

Submitter Full Name: Craig Sato
Organization: ChargePoint, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 05 17:33:28 EDT 2017

Public Input No. 3376-NFPA 70-2017 [Section No. 625.17(A)]

(A) Power-Supply Cord.

The cable for cord-connected equipment shall comply with all of the following:

(1) Be any of the types specified in 625.17(B) or hard service cord, junior hard service cord, or portable power cable types in accordance with Table 400.4. Hard service cord, junior hard service cord, or portable power cable types shall be listed, as applicable, for exposure to oil and damp and wet locations.

(2) ~~Have an ampacity as specified in Table 400.5(A)(1) or, for 8 AWG and larger, in the 60°C columns of Table 400.5(A)(2).~~

(3) Have an overall length as specified in 625.17(A)(3)a. or b as follows:

(4) When the interrupting device of the personnel protection system specified in 625.22 is located within the enclosure of the supply equipment or charging system, the power-supply cord shall be not more than 300 mm (12 in.) long,

(5) When the interrupting device of the personnel protection system specified in 625.22 is located at the attachment plug, or within the first 300 mm (12 in.) of the power-supply cord, the overall cord length shall be a minimum of 1.8 m (6 ft) and shall be not greater than 4.6 m (15 ft).

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 10/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

The ampacity of the power supply cord of Listed EVSE is required to be no less than its current rating according to Clause 12.2.1.3 of ANSI/UL 2594, the Standard for Electric Vehicle Supply Equipment.

(For reference, text from ANSI/UL 2594):
12.2.1.3 A flexible power cord shall be rated for a voltage not less than the rated voltage of the equipment, and shall have a current rating not less than the current rating of the device.

The ampacity of the power supply cord of Listed EVSE is required to be no less than its current rating according to Clause 11.4.2.2 of ANSI/UL 2202, the Standard for Electric Vehicle (EV) Charging System Equipment.

(For reference, text from ANSI/UL 2202):
11.4.2.2 The voltage rating of a flexible cord shall be at least the rated voltage of the unit, and its ampacity shall be at least the current rating of the unit.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL “White Book” under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: “Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL’s Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations.”
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL’s Standards may be made by any interested party using UL’s on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory
- The Informational Note in Section 110.3(C) provides reference to OSHA’s Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL’s Electrical Connections (a supplement of The Code Authority), dated November 2010:

“Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625."

For simplicity, references to UL's programs for Listing have been noted. Similar programs are available from all NRTL's. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3373-NFPA 70-2017 [Section No. 625.17(A)]	

Submitter Information Verification

Submitter Full Name: Craig Sato
Organization: ChargePoint, Inc.
Street Address:
City:
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Submittal Date: Tue Sep 05 17:37:05 EDT 2017

Public Input No. 3388-NFPA 70-2017 [Section No. 625.17(A)]

(A) Power-Supply Cord.

The cable for cord-connected equipment shall comply with all of the following:

(1) Be any of the types specified in 625.17(B) or hard service cord, junior hard service cord, or portable power cable types in accordance with Table 400.4. Hard service cord, junior hard service cord, or portable power cable types shall be listed, as applicable, for exposure to oil and damp and wet locations.

(2) Have an ampacity as specified in Table 400.5(A)(1) or, for 8 AWG and larger, in the 60°C columns of Table 400.5(A)(2).

(3) Have an overall length as specified in 625.17(A)(3)a. or b as follows:

(4) When the interrupting device of the personnel protection system specified in 625.22 is located within the enclosure of the supply equipment or charging system, the power-supply cord shall be not more than 300 mm (12 in.) long,

(5) ~~When the interrupting device of the personnel protection system specified in 625.22 is located at the attachment plug, or within the first 300 mm (12 in.) of the power-supply cord, the overall cord length shall be a minimum of 1.8 m (6 ft) and shall be not greater than 4.6 m (15 ft).~~

a.

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 11/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

When the interrupting device for personnel protection is located within the enclosure of Listed EVSE complying with ANSI/UL 2594, the Standard for Electric Vehicle Supply Equipment, the power supply cord shall have a length not exceeding 12 in. according to Clause 12.2.1.2(a) and 9.2.3(a).

(For reference, text from ANSI/2594):
12.2.1.2(a) When the interrupting device of the equipment of the personnel protection system is located within the enclosure of the device, the power cord shall have a length corresponding to the values shown in 9.2.3 and the device shall be marked in accordance with 72.17.

9.2.3 The interrupting device provided as part of the personnel protection system is required to be located at the attachment plug or not more than indicated in (a) and (b) from the attachment plug:

(a) For Mexico and the United States, 300 mm (12 inches) for all products.

When the interrupting device for personnel protection is located within the enclosure of Listed EVSE complying with ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment, the power supply cord shall have a length not exceeding 12 in. according to Clause 11.4.2.6.

(For reference, text from ANSI/UL 2202):
11.4.2.6 Cord and plug connected units shall have ground fault protection for personnel meeting the requirements in 6.1 as an integral part of the attachment plug or located in the power supply cable not more than 12 inches (305 mm) from the attachment plug.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL “White Book” under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
  o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
  o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
  o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
  o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
  o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: “Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL’s Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations.”
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL’s Standards may be made by any interested party using UL’s on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory
- The Informational Note in Section 110.3(C) provides reference to OSHA’s Nationally Recognized Testing

Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).

- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL's Electrical Connections (a supplement of The Code Authority), dated November 2010:

"Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625."

For simplicity, references to UL's programs for Listing have been noted. Similar programs are available from all NRTL's. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3376-NFPA 70-2017 [Section No. 625.17(A)]	

Submitter Information Verification

Submitter Full Name: Craig Sato

Organization: ChargePoint, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Tue Sep 05 18:19:23 EDT 2017

Public Input No. 3663-NFPA 70-2017 [Section No. 625.17(A)]

(A) Power-Supply Cord.

The cable for cord-connected equipment shall ~~comply with all of the following: Be any of the types specified in 625.17(B) or hard service cord, junior hard service cord, or portable power cable types in accordance with Table 400.4 . Hard service cord, junior hard service cord, or portable power cable types shall~~ be ~~listed, as applicable, for exposure to oil and damp and wet locations.~~

- ~~Have an ampacity as specified in Table 400.5(A)(1) or, for 8 AWG and larger, in the 60°C columns of Table 400.5(A)(2) .~~
- ~~Have an overall length as specified in 625.17(A)(3)a. or b as follows:~~

(1) ~~When the interrupting device of the personnel protection system specified in 625.22 is located within the enclosure of the supply equipment or charging system, the power-supply cord shall be not more than 300 mm (12 in.) long,~~

(2) ~~When the interrupting device of the personnel protection system specified in 625.22 is located at the attachment plug, or within the first 300 mm (12 in.) of the power-supply cord, the overall cord length shall be a minimum of 1.8 m (6 ft) and shall be not greater than 4.6 m (15 ft).~~

a part of the Listed EV Supply Equipment.

Statement of Problem and Substantiation for Public Input

The construction features being addressed here are evaluated as a part of the Listing certification program. These requirements are evaluated during the certification (Listing) of the product. The requirements in UL 2594 state:

12.2 Cord connected devices
12.2.1.2 The cord shall be type G, SEO, SO, STO, SJEO, SJO, SJTO, or W, or a cord that is equally serviceable. The flexible power cord shall terminate at the enclosure of the device. The overall length of the power cord shall comply with one of the following. The overall length of the power cord is measured from the face of the attachment plug to the point where it enters the enclosure:
a) When the interrupting device of the personnel protection system is located within the enclosure of the device, the power cord shall have a length corresponding to the values shown in 9.2.3 and the device shall be marked in accordance with 72.17.
b) When the interrupting device of the personnel protection system is located at the attachment plug, or within the distances required by 9.2.3, the overall cord length shall be a minimum of 1.8 m (6 feet) and shall be no greater than 4.6 m (15 feet).

9.2.3 The interrupting device provided as part of the personnel protection system is required to be located at the attachment plug or not more than indicated in (a) and (b) from the attachment plug:
a) For Mexico and the United States, 300 mm (12 inches) for all products.

72.17 Products provided with a 300-mm (12-inch) long power cord shall be marked on the product or on the power cord with the word “WARNING” and the following or the equivalent, “To avoid a risk of fire or electric shock, do not use this device with an extension cord.”

Submitter Information Verification

Submitter Full Name: Gregory C Nieminski
Organization: Gregory C. Nieminski, LLC
Affiliation: EPRI NEC Task Force
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Submittal Date: Wed Sep 06 16:22:23 EDT 2017

Copyright Assignment

I, Gregory C Nieminski, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am Gregory C Nieminski, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Input No. 3797-NFPA 70-2017 [Section No. 625.17(A)]

(A) Power-Supply Cord.

The cable for cord-connected equipment shall comply with all of the following:

(1) Be any of the types specified in 625.17(B) or hard service cord, junior hard service cord, or portable power cable types in accordance with Table 400.4. Hard service cord, junior hard service cord, or portable power cable types shall be listed, as applicable, for exposure to oil and damp and wet locations.

(2) Have an ampacity as specified in Table 400.5(A)(1) or, for 8 AWG and larger, in the 60°C columns of Table 400.5(A)(2).

(3) Have an overall length as specified in 625.17(A)(3)a. or b as follows:

~~When the interrupting device of the personnel protection system specified in 625.22 is located within the enclosure of the supply equipment or charging system~~

a. ,

~~the power-supply cord shall be not more than 300 mm (12 in.) long,~~

a.

b. When the interrupting device of the personnel protection system specified in 625.22 is located at the attachment plug, or within the first 300 mm (12 in.) of the power-supply cord, the overall cord length shall be a minimum of 1.8 m (6 ft) and shall be not greater than 4.6 m (15 ft).

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 12/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

When the interrupting device for personnel protection is located within the enclosure of Listed EVSE complying with ANSI/UL 2594, the Standard for Electric Vehicle Supply Equipment, the power supply cord shall have a length not exceeding 12 in. according to Clause 12.2.1.2(a) and 9.2.3(a).

(For reference, text from ANSI/2594):
12.2.1.2(a) When the interrupting device of the equipment of the personnel protection system is located within the enclosure of the device, the power cord shall have a length corresponding to the values shown in 9.2.3 and the device shall be marked in accordance with 72.17.

9.2.3 The interrupting device provided as part of the personnel protection system is required to be located at the attachment plug or not more than indicated in (a) and (b) from the attachment plug:

(a) For Mexico and the United States, 300 mm (12 inches) for all products.

When the interrupting device for personnel protection is located within the enclosure of Listed EVSE complying with ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment, the power supply cord shall have a length not exceeding 12 in. according to Clause 11.4.2.6.

(For reference, text from ANSI/UL 2202):
11.4.2.6 Cord and plug connected units shall have ground fault protection for personnel meeting the requirements in 6.1 as an integral part of the attachment plug or located in the power supply cable not more than 12 inches (305 mm) from the attachment plug.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL "White Book" under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
  o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
  o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
  o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
  o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
  o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: "Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL's Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations."
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL's Standards may be made by any interested party using UL's on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of

equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory

- The Informational Note in Section 110.3(C) provides reference to OSHA's Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL's Electrical Connections (a supplement of The Code Authority), dated November 2010:

"Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625."

For simplicity, references to UL's programs for Listing have been noted. Similar programs are available from all NRTL's. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3388-NFPA 70-2017 [Section No. 625.17(A)]	

Submitter Information Verification

Submitter Full Name: Craig Sato
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Submittal Date: Wed Sep 06 21:47:31 EDT 2017

Public Input No. 1203-NFPA 70-2017 [Section No. 625.17(B)]

(B)

Output Cable to the Electric Vehicle.

~~The output cable to the electric vehicle shall be one of the following :~~

~~(1) Listed - Type EV, EVJ, EVE, EVJE, EVT,~~

~~or~~

~~OR EVJT flexible cable as specified in Table 400.4 .~~

~~(2) An integral part of listed electric vehicle supply equipment.~~

~~Informational Note:~~

~~Listed~~

~~For information and listing requirements for electric vehicle supply equipment~~

~~may incorporate output cables having ampacities greater than 60°C based on the permissible temperature limits for the components and the cable.~~

~~, see UL Standards 2594-2016. *Standard for Electric Vehicle Supply Equipment* , and UL 2202-2009.~~

~~*Standard for Electric Vehicle (EV) Charging System Equipment.*~~

Statement of Problem and Substantiation for Public Input

The introduction of multiple long range, mass-market priced Electric Vehicles (EVs) requires an exponential growth in the number of fast charge stations. Due to the larger batteries, fast charges must increase the power delivery rates in order to keep the charging times reasonable.

Using the cable types and constructions presently described in Section 625.17(B) for fast charging long range EVs would result in cables so large and heavy that they would be practically unusable.
Furthermore, the language used in Section 625 .17 (B) is overly restrictive and precludes any innovation or progress to deliver smaller, lighter, and safer cables to the public.

The proposed language in this TIA recognizes the fast evolving EV charging technology while addressing the safety concerns by allowing the use of engineered cabling solutions that are an integral (non-detachable) part of the listed electric vehicle supply equipment (EVSE).

Submitter Information Verification

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Submittal Date: Fri Jul 21 09:00:04 EDT 2017

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Public Input No. 1204-NFPA 70-2017 [Section No. 625.17(B)]

(B) Output Cable to the Electric Vehicle.

The output cable to the electric vehicle shall be Type EV, EVJ, EVE, EVJE, EVT, or EVJT flexible cable as specified in Table 400.4.

Informational Note: Listed electric vehicle supply equipment may incorporate output cables having ampacities greater than 60°C based on the permissible temperature limits for the components and the cable.

(1) *Revise 625.17(B) as follows:*

(B) Output Cable to the Electric Vehicle. The output cable to the electric vehicle shall be one of the following :

(1) Listed Type EV, EVJ, EVE, EVJE, EVT, OR EVJT flexible cable as specified in Table 400.4.

(2) An integral part of listed electric vehicle supply equipment.

Informational Note: ~~Listed electric vehicle supply equipment may incorporate output cables having ampacities greater than 60° C based on the permissible temperature limits for the components and the cable.~~ For information and listing requirements for electric vehicle supply equipment, see UL Standards 2594-2016. *Standard for Electric Vehicle Supply Equipment* , and UL 2202-2009.

Standard for Electric Vehicle (EV) Charging System Equipment.

Statement of Problem and Substantiation for Public Input

The introduction of multiple long range, mass-market priced Electric Vehicles (EVs) requires an exponential growth in the number of fast charge stations. Due to the larger batteries, fast charges must increase the power delivery rates in order to keep the charging times reasonable.

Using the cable types and constructions presently described in Section 625.17(B) for fast charging long range EVs would result in cables so large and heavy that they would be practically unusable.
Furthermore, the language used in Section 625 .17 (B) is overly restrictive and precludes any innovation or progress to deliver smaller, lighter, and safer cables to the public.

The proposed language in this TIA recognizes the fast evolving EV charging technology while addressing the safety concerns by allowing the use of engineered cabling solutions that are an integral (non-detachable) part of the listed electric vehicle supply equipment (EVSE).

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Public Input No. 2464-NFPA 70-2017 [Section No. 625.17(B)]

(B) Output Cable to the Electric Vehicle.

The output cable to the electric vehicle shall be one of the following:

(1) Listed Type EV,EVJ, EVE, EVJE, EVT, or EVJT flexible cable as specified in Table 400.4

(2) An integral, nondetachable part of the listed electric vehicle supply equipment .

Informational Note: ~~Listed~~ For information and listing requirements for electric vehicle supply equipment ~~may incorporate output cables having ampacities greater than 60°C based on the permissible temperature limits for the components and the cable~~ , see UL 2594-2016, *Standard for Electric Vehicle SuppyEquipment* , and UL 2202-2009, *Standard for Electric Vehicle (EV) Charging System Equipment* .

Statement of Problem and Substantiation for Public Input

The introduction of multiple long range, mass-market priced Electric Vehicles (EVs) requires an exponential growth in the number of fast charge stations. Due to the larger batteries, fast charges must increase the power delivery rates in order to keep the charging times reasonable.

Using the cable types and constructions presently described in Section 625.17(B) for fast charging long range EVs would result in cables so large and heavy that they would be practically unusable. Furthermore, the language used in Section 625 .17 (B) is overly restrictive and precludes any innovation or progress to deliver smaller, lighter, and safer cables to the public. The proposed language in this PI, which matches that of a TIA on the same topic, recognizes the fast evolving EV charging technology while addressing the safety concerns by allowing the use of engineered cabling solutions that are an integral (non-detachable) part of the listed electric vehicle supply equipment (EVSE).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2462-NFPA 70-2017 [Section No. 625.17(A)]	

Submitter Information Verification

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Submittal Date: Fri Aug 18 14:18:49 EDT 2017

Public Input No. 3391-NFPA 70-2017 [Section No. 625.17(B)]

~~**(B)** Output Cable to the Electric Vehicle.~~

~~The output cable to the electric vehicle shall be Type EV, EVJ, EVE, EVJE, EVT, or EVJT flexible cable as specified in Table 400.4 .~~

~~Informational Note: Listed electric vehicle supply equipment may incorporate output cables having ampacities greater than 60°C based on the permissible temperature limits for the components and the cable.~~

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
[This serves as Part 13/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.]

Listed EVSE complying with ANSI/UL 2594, the Standard for Electric Vehicle (EV) Supply Equipment, are required to utilize one of the cable Types specified in 625.17(B). This construction requirement is specified in Clause 13.1.8 of the Standard.

(For reference, text from ANSI/UL 2594):
13.1.8 The EV cables shall be Type EV, EVJ, EVE, EVJE, EVT, or EVJT, and shall have a minimum voltage rating corresponding to the overall output rating of the EV supply equipment.

Listed EVSE complying with ANSI/UL 2202, the Standard for Electric Vehicle (EV) Charging System Equipment, are required to utilize one of the cable Types specified in 625.17(B). This construction requirement is specified in Clause 13.2 of the Standard.

For reference, text from ANSI/UL 2202):
13.2 The cable intended for the connection to the vehicle shall be Type EV, EVJ, EVE, EVJE, EVT, or EVJT, and be attached to or provided with the product. The cable and supply conductors shall be of a size and rating intended for the application.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL "White Book" under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: "Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL's Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations."
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL's Standards may be made by any interested party using UL's on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory
- The Informational Note in Section 110.3(C) provides reference to OSHA's Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL's Electrical Connections (a supplement of The Code Authority), dated November 2010:

"Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625."

For simplicity, references to UL's programs for Listing have been noted. Similar programs are available from all NRTL's. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by

Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

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Submittal Date: Tue Sep 05 18:33:35 EDT 2017

Public Input No. 3670-NFPA 70-2017 [Section No. 625.17(B)]

(B) Output Cable.

(1) Output Cable to the Electric Vehicle.

The output cable to the electric vehicle shall be one of the following:

a. Listed Type EV, EVJ, EVE, EVJE, EVT, or EVJT flexible cable as specified in Table 400.4.

b. An integral part of the Listed Electric Vehicle Supply Equipment.

Informational Note :

~~Listed electric vehicle supply equipment may incorporate output cables having ampacities greater than 60°C based on the permissible temperature limits for the components and the cable.~~ For information and listing requirements for electric vehicle supply equipment, see UL Standards 2594-2016, Standard for Electric Vehicle Supply Equipment, and UL 2202-2009, Standard for Electric Vehicle (EV) Charging System Equipment.

(2) Output Cable to the Primary Pad.

a. Listed Type EV, EVE, or EVT flexible cable as specified in Table 400.4 to the primary pad. The output cable shall have an ampacity as specified in Table 400.5(A)(1) or, for 8 AWG and larger, in the 60°C columns of Table 400.5(A)(2) .

b. An integral part of listed Wireless Power Transfer Equipment (WPTE).

Exception to (B)(2): An approved wiring system may be permitted in place of the output cable to the primary pad. [See 625.102(E)].

Informational Note: For information and listing requirements for wireless power transfer equipment, see UL Standard 2750, Standard for Electric Vehicle Wireless Power Transfer Equipment.

Statement of Problem and Substantiation for Public Input

This comment reintroduces the comment made by CMP12 in TIA 1296 (Reference 625.17(B)) that is currently being balloted. Closing date for comment: September 14, 2017. It has been renumbered to permit the addition of item 2. Otherwise, the text of TIA No. 1296 is unchanged.

The comment also adds new item (2) for Output Cables to the Primary Pad and identifies the Extra Hard Usage cable types suitable for Wireless Power Transfer Equipment (WPTE) where the cable will be lying on the floor or ground.

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Public Input No. 4307-NFPA 70-2017 [Section No. 625.17(B)]

(B) Output Cable to the Electric Vehicle.

The output cable to the electric vehicle shall be one of the following:

(1) Listed Type EV, EVJ, EVE, EVJE, EVT, or EVJT flexible cable as specified in Table 400.4 .

(2) An integral part of listed electric vehicle supply equipment.

Informational Note: ~~Listed~~ For information and listing requirements for electric vehicle supply equipment ~~may incorporate output cables having ampacities greater than 60°C based on the permissible temperature limits for the components and the cable~~ , see UL Standards 2594-2016, Standard for Electric Vehicle Supply Equipment, and UL 2202-2009, Standard for Electric Vehicle (EV) Charging System Equipment .

Statement of Problem and Substantiation for Public Input

The introduction of multiple long range, mass-market priced Electric Vehicles (EVs) requires an exponential growth in the number of fast charge stations. Due to the larger batteries, fast chargers must increase the power delivery rates in order to keep the charging times reasonable.

Using the cable types and constructions presently described in Section 625.17(B) for fast charging long range EVs would result in cables so large and heavy that they would be practically unusable. Furthermore, the language used in Section 625 .17 (B) is overly restrictive and precludes any innovation or progress to deliver smaller, lighter, and safer cables to the public.

NEC Section 625.17(B) created undue hardship on the Electric Vehicle industry and consumers by failing to recognize and address the practical and safety concerns voiced at the NFPA Technical Session. The EV equipment industry developed technology to address these concerns but its deployment is hampered by the existing Code language. The new proposed language here recognizes the fast evolving EV charging technology the public wants, while addressing the publicly conveyed safety concerns by allowing the use of engineered cabling solutions that are integral (non-detachable) part of a listed EVSE. The NEC must recognize the needs of the EV industry and the public by supporting innovation now or we will inevitably fall behind other nations in advancing sustainable energy transportation being them electric cars, SUVs, buses, or trucks.

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Submittal Date:	Thu Sep 07 19:36:19 EDT 2017

Public Input No. 273-NFPA 70-2017 [New Section after 625.17(B)]

TITLE OF NEW CONTENT

Type your content here ...

The output cable shall have an ampacity as specified in Table 400.5(A)(1) or, for 8 AWG and larger, in the 60°C columns of Table 400.5(A)(2).

(2) Output Cable to the Primary Pad. If used, the output cable to the primary pad shall be Type EV, EVJ, EVE, EVJE, EVT or EVJT flexible cable as specified in Table 400.4. The output cable shall have an ampacity as specified in Table 400.5(A)(1) or, for 8 AWG and larger, in the 60°C columns of Table 400.5(A)(2).

Exception to (B)(2): An approved wiring system may be permitted in place of the output cable to the primary pad. See 625.102(E).

Exception to (B) : Listed electric vehicle supply equipment may incorporate output cables having ampacities greater than the ampacities in the 60°C columns of Table 400.5(A)(2) based on the permissible temperature limits for the components and the cable .

Statement of Problem and Substantiation for Public Input

The code should not limit the cable technologies used in advancing product design.

The recommendation clarifies which cables are suitable for use as Output Cables to the Electric Vehicle. These cables, as outlined in Table 400.4, are evaluated and listed to UL 62 (STANDARD FOR SAFETY Flexible Cords and Cables) meeting specific construction and performance requirements. When used as a component in Electric Vehicle Supply Equipment, these cables are further evaluated to the requirements in UL 2594 (STANDARD FOR SAFETY Electric Vehicle Supply Equipment). This testing ensures that the specific cables used in the listed EVSE are suitable for safe use in this application.

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Public Input No. 2465-NFPA 70-2017 [Section No. 625.17(C)]

(C) Overall Cord and Cable Length.

The overall usable length shall not exceed 7.5 m (25 ft) unless equipped with a cable management system that is part of the listed electric vehicle supply equipment.

(1) ~~Not Fastened in Place.~~

~~Where the electric vehicle supply equipment or charging system is not fastened in place~~

Portable Equipment .

For portable EVSE , the cord-exposed usable length shall be measured from the face of the attachment plug to the face of the electric vehicle connector.

(2) Fastened in Place.

Where the electric vehicle supply ~~equipment or charging system is~~ equipment is fastened in place, the usable length of the output cable shall be measured from the cable exit of the electric vehicle supply ~~equipment or charging system to~~ equipment to the face of the electric vehicle connector.

Statement of Problem and Substantiation for Public Input

This revision has two changes. The first change is to remove the designation of equipment not fastened in place. The Article designates three types of products: portable, fastened in place, and fixed. Therefore, when referring to power cords and “not fastened in place” we are simply discussing portable devices, which is a defined term. The second change has to do with the elimination of the words “or charging system.” These words are not needed as informational note 2 under the EVSE definition already states that EVSE is used to represent electric vehicle charging systems. So this wording is redundant and can be removed.

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Public Input No. 3395-NFPA 70-2017 [Section No. 625.17(C) [Excluding any Sub-Sections]]

~~The overall usable length shall not exceed 7.5 m (25 ft) unless equipped with a cable management system that is part of the listed electric vehicle supply equipment.~~

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 16/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

The output cable of Listed EVSE complying with ANSI/UL 2594, the Standard for Electric Vehicle Supply Equipment, is required to have maximum length not exceeding 7.5 m (25 ft) unless provided with a cable management system as specified in Clause 13.1.10 and Clause 13.1.10.1 of the Standard.

(For reference, text from ANSI/UL 2594):
13.1.10 Except as indicated in 13.1.10.1, the overall length of the EV cable shall not exceed 7.5 m (25 feet) in length. The length is measured from the point where the cable exits the EV supply equipment enclosure for permanently connected EV cable, or from where the cable exits the EV plug enclosure if provided as part of a cable assembly intended to connect to an EV receptacle located on the EV supply equipment, to the point where it enters the EV connector enclosure on the vehicle side of the EV cable.

13.1.10.1 EV supply equipment provided with a suitable cable management system is allowed to have a cable in excess of 7.5 m (25 feet). The cable management system shall control the cable so that it is not allowed to rest on the floor or supporting surface after use.

The output cable of Listed EVSE complying with ANSI/UL 2202, the Standard for Electric Vehicle (EV) Charging

System Equipment, is required to have maximum length not exceeding 7.5 m (25 ft) unless provided with a cable management system as specified in Clause 13.3 of the Standard.

(For reference, text from ANSI/UL 2202):
13.3 The overall length of the cable intended for connection to an EV shall not exceed 25 feet (7.63 m) unless it is equipped with a cable management system that is suitable for the purpose.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL "White Book" under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: "Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL's Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations."
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL's Standards may be made by any interested party using UL's on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory
- The Informational Note in Section 110.3(C) provides reference to OSHA's Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL's Electrical Connections (a supplement of The Code Authority), dated November 2010:

"Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625."

For simplicity, references to UL's programs for Listing have been noted. Similar programs are available from all NRTL's. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3398-NFPA 70-2017 [Section No. 625.17(C)(2)]	

Submitter Information Verification

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Copyright Assignment

I, Craig Sato, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am Craig Sato, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Input No. 3396-NFPA 70-2017 [Section No. 625.17(C)(1)]

~~**(1)** Not Fastened in Place.~~

~~Where the electric vehicle supply equipment or charging system is not fastened in place, the cord-exposed usable length shall be measured from the face of the attachment plug to the face of the electric vehicle connector.~~

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 14/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

The length of the output cable of Listed EVSE not fastened in place complying with ANSI/UL 2594, the Standard for Electric Vehicle Supply Equipment, is measured from the point where the cable exits the plug enclosure to the point where it enters the EV connector enclosure as specified in Clause 13.1.10 of the Standard.

(For reference, text from ANSI/UL 2594):
13.1.10 Except as indicated in 13.1.10.1, the overall length of the EV cable shall not exceed 7.5 m (25 feet) in length. The length is measured from the point where the cable exits the EV supply equipment enclosure for permanently connected EV cable, or from where the cable exits the EV plug enclosure if provided as part of a cable assembly intended to connect to an EV receptacle located on the EV supply equipment, to the point where it enters the EV connector enclosure on the vehicle side of the EV cable.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL "White Book" under Guide FFWA or FFTG.

Background:

- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
    - o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
    - o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
    - o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
    - o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
    - o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: "Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL's Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations."
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL's Standards may be made by any interested party using UL's on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory
- The Informational Note in Section 110.3(C) provides reference to OSHA's Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL's Electrical Connections (a supplement of The Code Authority), dated November 2010:

"Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625."

For simplicity, references to UL's programs for Listing have been noted. Similar programs are available from all NRTL's. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3391-NFPA 70-2017 [Section No. 625.17(B)]	

Submitter Information Verification

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Submittal Date: Tue Sep 05 18:55:06 EDT 2017

Copyright Assignment

Public Input No. 3398-NFPA 70-2017 [Section No. 625.17(C)(2)]

~~**(2)** Fastened in Place.~~

~~Where the electric vehicle supply equipment or charging system is fastened in place, the usable length of the output cable shall be measured from the cable exit of the electric vehicle supply equipment or charging system to the face of the electric vehicle connector.~~

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 15/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

The length of the output cable of Listed EVSE fastened in place complying with ANSI/UL 2594, the Standard for Electric Vehicle Supply Equipment, is measured from the point where the cable exits the EVSE enclosure to the point where it enters the EV connector enclosure as specified in Clause 13.1.10 of the Standard.

(For reference, text from ANSI/UL 2594):
13.1.10 Except as indicated in 13.1.10.1, the overall length of the EV cable shall not exceed 7.5 m (25 feet) in length. The length is measured from the point where the cable exits the EV supply equipment enclosure for permanently connected EV cable, or from where the cable exits the EV plug enclosure if provided as part of a cable assembly intended to connect to an EV receptacle located on the EV supply equipment, to the point where it enters the EV connector enclosure on the vehicle side of the EV cable.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL "White Book" under Guide FFWA or FFTG.

Background:

- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
  - o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
  - o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
  - o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
  - o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
  - o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: “Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL’s Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations.”
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL’s Standards may be made by any interested party using UL’s on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory
- The Informational Note in Section 110.3(C) provides reference to OSHA’s Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL’s Electrical Connections (a supplement of The Code Authority), dated November 2010:

“Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625.”

For simplicity, references to UL’s programs for Listing have been noted. Similar programs are available from all NRTL’s. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL’s titled “A Seller’s Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States” that is available for viewing from the Intertek website.

Submitter Information Verification

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Submittal Date: Tue Sep 05 18:57:32 EDT 2017

Copyright Assignment

Public Input No. 2466-NFPA 70-2017 [New Section after 625.17(C)]

(D) Interconnecting Cabling Systems.

Other engineered cabling systems which are integral part(s) of listed EVSE, and are intended to interconnect pieces of equipment within an EVSE system, shall be permitted.

Statement of Problem and Substantiation for Public Input

In many cases, charging equipment consists of multiple cabinets, with the high power generation components located in a cabinet that is located remotely from the charging location in order to improve aesthetics or to provide for centralized and remote location to prevent access by the general public. In these cases, either conduit connection or cabling is provided between the high power cabinet and the public accessible “charge station” which is located at the charging location. In the case of the cables interconnecting these cabinets, there are currently no requirements in Article 625, which, according to 90.3, results in application of Chapters 1 -4. In some cases, those requirements will not be adequate with the current advancements in the industry such as 1000 V power levels or actively cooled systems. In these cases, specific engineered solutions are provided. There is no electrician choosing the interconnecting means as it is integral to the listed equipment system. This addition would permit these engineered solutions to be implemented in the field based on product listing as required by 625.5.

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Submittal Date: Fri Aug 18 14:29:39 EDT 2017

Public Input No. 4319-NFPA 70-2017 [New Section after 625.17(C)]

625.17(D) Other Cabling Systems.

Other engineered cabling systems which are integral part(s) of a Listed EVSE (Electric Vehicle Supply Equipment) shall be permitted.

Statement of Problem and Substantiation for Public Input

The introduction of multiple long range, mass-market priced Electric Vehicles (EVs) requires an exponential growth in the number of fast charger stations. Electric buses and trucks will also come into the market and their batteries are much larger than what is available for passenger cars today. Due to increasing number of EVs and larger batteries, fast chargers must increase the power delivery rates in order to keep the charging times reasonable.

The battery size of these new vehicles and the sheer number of charging stations on a single site requires the EVSEs (Electric Vehicle Supply Equipment) to evolve into a more distributed power architecture. This distributed architecture may require interconnections between sub-modules that are neither an "input power cord - 625(17)A", nor an "output cable to the EV - 625(17)B", yet are an integral part of the EVSE.

The key words are: "engineered" meaning the cabling system is specialized and not generally available for mass-market sale; "integral part" meaning it is not detachable from the original EVSE such that it could be misused on another EVSE; and "listed EVSE" meaning the entire system which includes the power conversion modules, input, output and interconnecting cables and connectors are evaluated as a whole by a professional, OSHA accredited NRTL (Nationally Recognized Test Laboratory).

This proposal clarifies this potential ambiguity Code enforcers might encounter in the near future when approving large scale charging station installation sites where engineered cabling systems are used for input, internal, and/or output for the EVSE.

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Public Input No. 2467-NFPA 70-2017 [Section No. 625.18]

625.18 Interlock.

~~Electric vehicle supply equipment~~ An interlock, either electrical or electromechanical, shall be provided for all equipment as follows:

(A) EVSE. EVSE shall be provided with an interlock that de-energizes the electric vehicle connector whenever the electrical vehicle connector is uncoupled from the electric vehicle inlet . An interlock shall not be required for portable cord-and-plug-connected electric vehicle supply equipment intended for connection to receptacle outlets rated at 125 volts, single phase, 15 and 20 amperes. An interlock shall not be required for dc supplies less than 60 volts dc.

(B) WPTE. WPTE shall be provided with an interlock that de-energizes the primary pad whenever the primary pad is de-coupled from the vehicle pad.

Statement of Problem and Substantiation for Public Input

The original requirement made reference to EVSE which would by use of this designation omit the need for interlocking on WPTE. However, it is critical that primary pads are not energized when there is no vehicle parked above them. This revision clarifies this by moving the original text to item (A) and adding the requirement for WPTE to item (B).

Submitter Information Verification

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Submittal Date:	Fri Aug 18 14:33:30 EDT 2017

Public Input No. 3404-NFPA 70-2017 [Section No. 625.18]

~~**625.18** Interlock.~~

~~Electric vehicle supply equipment shall be provided with an interlock that de-energizes the electric vehicle connector whenever the electrical connector is uncoupled from the electric vehicle. An interlock shall not be required for portable cord-and-plug-connected electric vehicle supply equipment intended for connection to receptacle outlets rated at 125 volts, single phase, 15 and 20 amperes. An interlock shall not be required for dc supplies less than 60 volts dc.~~

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 17/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

The external connections at the output of EVSE complying with ANSI/UL 2594, the Standard for Electric Vehicle Supply Equipment, are required to be protected by a means that de-energizes the cable conductors and vehicle connector upon separation of the cable from the EVSE or electric vehicle as specified in Clause 13.1.14 of the Standard.

(For reference, text from ANSI/UL 2594):
13.1.14 External connections at the output of the EV supply equipment or at the vehicle connector shall be protected by a means that de-energizes the cable connectors and the vehicle connector upon exposure to a strain that results in a short-circuit, separation of the cable from the EV supply equipment or the vehicle connector, or access to uninsulated hazardous live parts. In addition, there shall be no exposure to live parts after de-energization occurs. If breakaway couplings are used, they shall comply with Annex A, Ref. No. 5.

The external connections at the output of EVSE complying with ANSI/UL 2202, the Standard for Electric Vehicle (EV)

Charging System Equipment, are required to be protected by a mechanical interlock or other means such that the connection is not energized unless coupled to the electric vehicle as specified in Clause 13.4 of the Standard.

(For reference, text from ANSI/UL 2202):
13.4 External connections of a unit shall be protected by a mechanical interlock or other means so that the connection is not energized unless it is coupled to the EV.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL "White Book" under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
  o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
  o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
  o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
  o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
  o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: "Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL's Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations."
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL's Standards may be made by any interested party using UL's on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory
- The Informational Note in Section 110.3(C) provides reference to OSHA's Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL's Electrical Connections (a supplement of The Code Authority), dated November 2010:

"Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625."

For simplicity, references to UL's programs for Listing have been noted. Similar programs are available from all NRTL's. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3398-NFPA 70-2017 [Section No. 625.17(C)(2)]	

Submitter Information Verification

Submitter Full Name: Craig Sato
Organization: ChargePoint, Inc.
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City:
State:
Zip:
Submittal Date: Tue Sep 05 19:47:55 EDT 2017

Public Input No. 3675-NFPA 70-2017 [Section No. 625.18]

625.18 Interlock.

Electric vehicle supply equipment shall be provided with an interlock, either electrical, mechanical or combination thereof, that de-energizes the electric vehicle connector whenever the electrical vehicle connector is uncoupled from the electric vehicle inlet . An interlock shall not be required for portable cord-and-plug-connected electric vehicle supply equipment intended for connection to receptacle outlets rated at 125 volts, single phase, 15 and 20 amperes. An interlock shall not be required for dc supplies less than 60 volts dc.

Statement of Problem and Substantiation for Public Input

The use of an interlock to prevent the hazard being addressed here is evaluated as a part of the Listing certification program. The methods for compliance involve certain internal constructions, components and other features that the AHJ cannot inspect or examine in the field. Listed products will comply with 625.18.

UL 2202 requires that:

13.4 External connections of a unit shall be protected by a mechanical interlock or other means so that the connection is not energized unless it is coupled to the EV.

The text clarifies the types of interlocks (other means) that may be used in Listed EV supply equipment where the adequacy of the equipment has been determined during the certification process. The presence of a Listing Mark would indicate compliance.

Submitter Information Verification

Submitter Full Name: Gregory C Nieminski
Organization: Gregory C. Nieminski, LLC
Affilliation: EPRI NEC Task Force
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City:
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Zip:
Submittal Date: Wed Sep 06 16:53:33 EDT 2017

Public Input No. 2468-NFPA 70-2017 [Section No. 625.19]

625.19 Automatic De-Energization of Cable.

The electric vehicle supply equipment or the cable-connector combination of ~~the equipment~~ the EVSE shall be provided with an automatic means to de-energize the output cable ~~conductors~~ to the electric vehicle and electric vehicle connector upon exposure to strain that could result in either cable rupture or separation of the cable from the electric vehicle connector and exposure of live parts. Automatic means to de-energize the cable conductors and electric vehicle connector shall not be required for portable electric vehicle supply ~~equipment constructed in~~ equipment intended for connection to receptacle outlets in accordance with 625.44(A)(1) .

Statement of Problem and Substantiation for Public Input

This requirement applies only to EVSE. WPTE equipment, although it may be provided with a cable, does not have a connection to the vehicle and is intended to be secured in accordance with 625.102(D). So, revision to clarify that "equipment" means EVSE only, and then using the defined terms "output cable to the electric vehicle" and "electric vehicle connector" in the text, is needed to clarify this and facilitate common interpretation.

Submitter Information Verification

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Submittal Date: Fri Aug 18 14:44:29 EDT 2017

Public Input No. 3562-NFPA 70-2017 [Section No. 625.19]

~~**625.19** Automatic De-Energization of Cable.~~

~~The electric vehicle supply equipment or the cable-connector combination of the equipment shall be provided with an automatic means to de-energize the cable conductors and electric vehicle connector upon exposure to strain that could result in either cable rupture or separation of the cable from the electric connector and exposure of live parts. Automatic means to de-energize the cable conductors and electric vehicle connector shall not be required for portable electric vehicle supply equipment constructed in accordance with 625.44(A) .~~

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.

At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.

In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.

It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.

Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 18/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

The external connections at the output of EVSE complying with ANSI/UL 2594, the Standard for Electric Vehicle Supply Equipment, are required to be protected by a means that de-energizes the cable conductors and vehicle connector upon exposure to strain that could result in a short-circuit, or separation of the cable from the EVSE or electric vehicle as specified in Clause 13.1.14 of the Standard.

(For reference, text from ANSI/UL 2594):
13.1.14 External connections at the output of the EV supply equipment or at the vehicle connector shall be protected by a means that de-energizes the cable connectors and the vehicle connector upon exposure to a strain that results in a short-circuit, separation of the cable from the EV supply equipment or the vehicle connector, or access to uninsulated hazardous live parts. In addition, there shall be no exposure to live parts after de-energization occurs. If breakaway couplings are used, they shall comply with Annex A, Ref. No. 5.

The external connections at the output of EVSE complying with ANSI/UL 2202, the Standard for Electric Vehicle (EV) Charging System Equipment, are required to be protected by a means that de-energizes the cable conductors and connector upon exposure to strain that results in either cable rupture or separation of the cable from connector and exposure to live parts as specified in Clause 13.5 of the Standard.

(For reference, text from ANSI/UL 2202):
13.5 External connections of a unit shall be protected by a means that de-energizes the cable connectors and connector upon exposure to a strain which results in either cable rupture or separation of the cable from the connector and exposure of live parts.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL "White Book" under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
  o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
  o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
  o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
  o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
  o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: "Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL's Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations."
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL's Standards may be made by any interested party using UL's on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the equipment has been listed by a qualified electrical testing laboratory
- The Informational Note in Section 110.3(C) provides reference to OSHA's Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL's Electrical Connections (a supplement of The Code Authority), dated November 2010:

"Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system

equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625."

For simplicity, references to UL's programs for Listing have been noted. Similar programs are available from all NRTL's. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3404-NFPA 70-2017 [Section No. 625.18]	

Submitter Information Verification

Submitter Full Name: Craig Sato

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Submittal Date: Wed Sep 06 13:46:07 EDT 2017

Public Input No. 3679-NFPA 70-2017 [Section No. 625.19]

~~**625.19** Automatic De-Energization of Cable.~~

~~The electric vehicle supply equipment or the cable-connector combination of the equipment shall be provided with an automatic means to de-energize the cable conductors and electric vehicle connector upon exposure to strain that could result in either cable rupture or separation of the cable from the electric connector and exposure of live parts. Automatic means to de-energize the cable conductors and electric vehicle connector shall not be required for portable electric vehicle supply equipment constructed in accordance with 625.44(A) .~~

Statement of Problem and Substantiation for Public Input

The type of hazard being addressed here is evaluated as a part of the Listing certification program. The methods for compliance involve certain internal constructions, components and other features that the AHJ cannot inspect or examine in the field.

The requirement is evaluated during the certification (Listing) of the product. The requirements in UL 2594 state:

13 Output Connections and Wiring

13.1.14 External connections at the output of EV supply equipment or at the vehicle connector shall be protected by a means that de-energizes the cable conductors and vehicle connector upon exposure to a strain that results in a short circuit, separation of the cable from the EV supply equipment or the vehicle connector, or access to uninsulated hazardous live parts. In addition, there shall be no exposure to live parts after de-energization occurs. If breakaway couplings are used, they shall comply with Annex A, Ref. No. 5 (UL 2251 Standard for Plugs, Receptacles, and Couplers for Electric Vehicles).

Section 625.19 should be deleted as the determination of the adequacy of the equipment is determined during the certification process. The presence of a Listing Mark would indicate compliance.

Submitter Information Verification

Submitter Full Name: Gregory C Nieminski
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Submittal Date: Wed Sep 06 16:57:50 EDT 2017

Public Input No. 3567-NFPA 70-2017 [Section No. 625.22]

~~**625.22** Personnel Protection System.~~

~~The equipment shall have a listed system of protection against electric shock of personnel. Where cord-and-plug-connected equipment is used, the interrupting device of a listed personnel protection system shall be provided and shall be an integral part of the attachment plug or shall be located in the power-supply cord not more than 300 mm (12 in.) from the attachment plug. A personnel protection system shall not be required for supplies less than 60 volts dc.~~

Statement of Problem and Substantiation for Public Input

Problem:
Product construction requirements were developed and added to the Code (1999 Edition) at a time when there were no existing published ANSI product safety standards specifically covering electric vehicle charging equipment (EVSE). These requirements have served to drive the national deployment of electric vehicles, however, there are now two published ANSI product safety standards that cover EVSE with associated product listing programs available from several Nationally Recognized Testing Laboratories (NRTL). With these Standards and listing programs in place, the NEC can now continue to focus on the safe installation of EVSE as the NRTL serves to fulfill Section 90.7, examination of equipment for safety.
At present, all of the construction requirements in Part II of Article 625 address product features that are an integral part of the listed (as required by Section 625.5) EVSE. In fact, as shown below, the construction requirements in Part II can be readily seen as already covered within one or both of the ANSI safety standards covering EVSE. As a result, the inclusion of equipment construction requirements in the Code places the Authority Having Jurisdiction in the redundant and sometimes difficult position of performing the evaluation and verification of EVSE that has already been listed by an NRTL in accordance with published ANSI Standards. Unfortunately, there have already been examples where this has led to delays in the completion of listed EVSE installation as the AHJ did not understand how to verify product construction requirements.
In recognition of the fast track evolution of EV charging technology, on-going product safety standard development and maintenance and the adherence to the required level of safety is best left to the Standard Development Organization (in this case, UL) where a collaborative development process exists that is consensus based, open and transparent.
It is anticipated that the removal of product construction requirements in Part II of Article 625 and the placement of reliance upon NRTL listing based upon compliance to published ANSI safety standards will facilitate innovation in EVSE and the on-going adoption of electric vehicles by continuing to bring listed equipment to the marketplace that serves the needs of the motoring public.
Please refer to the Background information below for additional discussion.

Substantiation:
(This serves as Part 19/23 of a set of PI’s intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

Listed EVSE are in compliance with ANSI/UL 2594, the Standard for Electric Vehicle Supply Equipment, and are required to be provided with a personnel protection system meeting the requirements of UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements, and UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems, as specified in Clause 9.2.1.

In addition, Clause 9.2.3(a) of ANSI/UL 2594 states that for cord-and-plug connected equipment, the interrupting device provided as part of the personnel protection system shall be located either at the attachment plug or not more than 12 inches from the attachment plug.

(For reference, text from ANSI/UL 2594):
9.2.1 Electric vehicle supply equipment, with the exclusion of EV Power Outlets, shall be provided with a personnel protection system. The personnel protection system shall comply with the requirements in Annex A, Ref. No. 22 and Annex A, Ref. No. 23.
(submitter note – The Annex A References are to ANSI/UL 2231-1 and ANSI/UL 2231-2)

9.2.3 The interrupting device provided as part of the personnel protection system is required to be located at the attachment plug or not more than indicated in (a) and (b) from the attachment plug:

(a) For Mexico and the United States, 300 mm (12 inches) for all products.

Listed EVSE are in compliance with ANSI/UL 2202, the Standard for Electric Vehicle (EV) Charging System Equipment, and are required to be provided with a personnel protection system meeting the requirements of UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements, and UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems, as specified in Clause 6.1.

In addition, Clause 11.4.2.6 of ANSI/UL 2202 states that for cord-and-plug connected equipment, the interrupting device provided as part of the personnel protection system shall be either an integral part of the attachment plug or located in the power supply cable not more than 12 inches from the attachment plug.

(For reference, text from ANSI/UL 2202):
6.1 Personnel protection systems
6.1.1 Off board electric vehicle charging system equipment shall be provided with a system of protection in accordance with the requirements in the Standard for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits, Part 1: General Requirements, UL 2231-1, and the Standard for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 2: Particular Requirements for Protective Devices For Use in Charging Systems, UL 2231-2.

11.4.2.6 Cord and plug connected units shall have ground fault protection for personnel meeting the requirements referenced in 6.1 as an integral part of the attachment plug or located in the power supply cable not more than 12 inches (305 mm) from the attachment plug.

Listed EVSE are in compliance with either ANSI/UL 2594 or ANSI/UL 2202 and bear the Certified or Listed Mark of the NRTL. As an example, listed EVSE are covered in the UL “White Book” under Guide FFWA or FFTG.

Background:
- Article 625 was first published (1996 NEC) when there were no available published safety standard(s) covering electric vehicle supply equipment (EVSE)
- There are now several published ANSI Standards covering EVSE; all of these Standards are included in Informative Annex A (ref. Section 90.7, Informational Note No. 3)
  - o ANSI/UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment
  - o ANSI/UL 2594, Standard for Electric Vehicle Supply Equipment
  - o ANSI/UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
  - o ANSI/UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
  - o ANSI/UL 2251, Standard for Plugs, Receptacles, and Couplers for Electric Vehicles
- From the UL website: “Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization providing global conformity assessment programs and services. In addition to being a leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL’s Standards for Safety are used to evaluate and certify products and systems. These standards are used by manufacturers to help them design products and systems to meet the requirements for certification, by regulatory authorities who review the standard requirements to determine what products and systems are to be used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety in their codes, and by certification organizations that apply UL requirements for product evaluations.”
- The Scope of ANSI/UL 2202 and ANSI/UL 2594 states that the covered equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70
- The UL Standards are actively maintained through an ANSI/UL Standards Technical Panel - membership consists of a balanced set of interest groups – specifically, Producer, Testing and Standards Organizations, Supply Chain, AHJ, Government, Consumer, General Interest, Commercial/Industrial Users and International Delegate. A proposal to any of UL’s Standards may be made by any interested party using UL’s on-line Collaborative Standards Development System (CSDS)
- Section 90.1(A) of NFPA 70 states that the Code is not intended as a design specification
- Section 90.7 states that the intent of the Code is such that factory installed internal wiring or the construction of equipment need not be inspected at the time of installation except to detect alterations or damage – provided that the

equipment has been listed by a qualified electrical testing laboratory

- The Informational Note in Section 110.3(C) provides reference to OSHA's Nationally Recognized Testing Laboratory (NRTL) program – based upon 29 CFR 1910.7 – and states that listing of equipment by an NRTL signifies that the tested and listed/certified equipment complies with one or more appropriate product safety test standards. UL is an example of an NRTL – EVSE bearing the UL Certification or Listing Mark meets the intent of the definition of listed (Article 100) and Section 110.3(C).
- Section 625.5 of the Code requires that EVSE or WPTE shall be listed.

Excerpt from UL's Electrical Connections (a supplement of The Code Authority), dated November 2010:

"Ultimately, there are two things to keep in mind when inspecting the installation of electric vehicle charging systems covered by NEC Article 625:

1. The NEC requires this type of equipment to be listed.

2. UL Listed electric vehicle supply equipment (category FFWA) and UL Listed electric vehicle charging system equipment (category FFTG) when installed in accordance with the manufacturers installation instructions will be in compliance with all safety requirements of NEC Article 625."

For simplicity, references to UL's programs for Listing have been noted. Similar programs are available from all NRTL's. Another NRTL example is Intertek Testing Services – EVSE that has been independently evaluated by Intertek using the ANSI/UL Standards bear the ETL Listing Mark. ETL Listed products may be found on-line from the Intertek website within their ETL Listed Mark Directory.

There is an informative three-part blog that discusses the subject of NRTL's titled "A Seller's Inside Look: Understanding Electric Vehicle Supply Equipment (EVSE) in the United States" that is available for viewing from the Intertek website.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3562-NFPA 70-2017 [Section No. 625.19]	

Submitter Information Verification

Submitter Full Name: Craig Sato
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Submittal Date: Wed Sep 06 13:51:29 EDT 2017

Public Input No. 1954-NFPA 70-2017 [Section No. 625.41]

625.41 ~~Overcurrent Protection~~ Circuit Sizing .

~~Overcurrent protection for feeders and branch circuits supplying equipment~~ (A) Conductors. Conductors for branch circuits and feeders shall be sized for continuous ~~duty and shall have a rating of not less than 125 percent of the maximum load of the equipment. Where noncontinuous loads are supplied from the same feeder, the overcurrent device shall have a rating of not less than the sum of the noncontinuous loads plus 125 percent of the continuous loads.~~ load application in accordance with 210.19(A)(1) for branch circuits and 215.2 for feeders.

(B) Overcurrnet Protection. Overcurrent protection for branch circuits and feeders shall be sized for continuous load application in accordance with 210.20 for branch circuits and 215.3 for feeders.

Statement of Problem and Substantiation for Public Input

Revised title and text so the rule covers both conductor and protection sizing and references to 210 and 215 will help the user apply the requirements.

Submitter Information Verification

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Submittal Date: Wed Aug 09 11:49:38 EDT 2017

Public Input No. 2452-NFPA 70-2017 [Section No. 625.41]

625.41 Overcurrent Protection.

Overcurrent protection for feeders and branch circuits ~~supplying equipment shall~~ supplying EVSE (including bi-directional EVSE) and WPTE shall be sized for continuous duty and shall have a rating of not less than 125 percent of the maximum load of the equipment. Where noncontinuous loads are supplied from the same feeder, the overcurrent device shall have a rating of not less than the sum of the noncontinuous loads plus 125 percent of the continuous loads.

Statement of Problem and Substantiation for Public Input

With the inclusion of EVPE to the scope of this Article, the use of the term “equipment” would be ambiguous and must be replaced with the references to EVSE and WPTE in order to clarify which requirements apply to what type of equipment.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2442-NFPA 70-2017 [Section No. 90.2(A)]	
Public Input No. 2443-NFPA 70-2017 [Section No. 625.1]	
Public Input No. 2444-NFPA 70-2017 [New Definition after Definition: Electric Vehicle Storage B...]	
Public Input No. 2445-NFPA 70-2017 [Definition: Electric Vehicle Supply Equipment.]	
Public Input No. 2446-NFPA 70-2017 [Section No. 625.5]	
Public Input No. 2448-NFPA 70-2017 [Section No. 625.16]	
Public Input No. 2449-NFPA 70-2017 [New Section after 625.40]	
Public Input No. 2454-NFPA 70-2017 [Section No. 625.43]	
Public Input No. 2455-NFPA 70-2017 [Section No. 625.44]	
Public Input No. 2456-NFPA 70-2017 [Section No. 625.48]	
Public Input No. 2458-NFPA 70-2017 [Article 625]	

Submitter Information Verification

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Submittal Date: Fri Aug 18 12:48:10 EDT 2017

Public Input No. 1955-NFPA 70-2017 [Section No. 625.42]

625.42 Rating.

The equipment shall have sufficient rating to supply the load served. ~~Electric vehicle charging loads shall be considered to be continuous loads for the purposes of this article.~~ Where an automatic load management system is used, the maximum equipment load on a service and feeder shall be the maximum load permitted by the automatic load management system.

Statement of Problem and Substantiation for Public Input

Delete text about continuous load, since it's covered in 625.41.

Submitter Information Verification

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Public Input No. 4285-NFPA 70-2017 [Section No. 625.42]

625.42 Rating.

The equipment shall have sufficient rating to supply the load served. Electric vehicle charging loads shall be considered to be continuous loads for the purposes of this article. Where an automatic load management system is used, the maximum equipment load on a service and feeder shall be the maximum load permitted by the automatic load management system. Electric vehicle supply equipment with restricted access to an ampere adjusting means shall be permitted to have an ampere rating(s) that is equal to the adjusted current setting. Service and feeder may be sized to match the adjusting means. Restricted access shall be defined as located behind one of the following:

(1) Removable cover or door which is secured by screw(s) or bolt(s) and must be removed to access the adjusting means

(2) Bolted equipment enclosure doors

(3) Locked doors accessible only to qualified personnel

(4) Password protected commissioning software accessible only to qualified personnel

Statement of Problem and Substantiation for Public Input

On older neighborhoods where the infrastructure provided by the power utility does not or can not support higher current (e.g. 100A) service inputs, an EVSE which has a (restricted access) means to configure the device such that it informs the EV of its current rating would enable installations to be deployed safely and avoid nuisance trips of the overcurrent protection device (e.g. circuit breaker) adequately sized for the wiring that supplies the EVSE. The EVSE's construction would be such that it is sized for its maximum current rating and the "current rating adjusting means" merely enables current technology already required of the EV manufacturers (SAE J1772 Pilot signal) to be used to coordinate overcurrent protection devices at the installation site.

This feature addresses potential issues when multiple EVs need to share multiple charging stations and not enough feeders are available as in the case of 2 or 3 car garages or retrofitting apartment building garages hosting many charging stations.

Submitter Information Verification

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Affiliation: Tesla, Inc.

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Submittal Date: Thu Sep 07 18:58:18 EDT 2017

Public Input No. 2454-NFPA 70-2017 [Section No. 625.43]

625.43 Disconnecting Means.

~~For equipment rated~~ For EVSE (including bi-directional EVSE) and WPTE rated more than 60 amperes or more than 150 volts to ground, the disconnecting means shall be provided and installed in a readily accessible location. The disconnecting means shall be lockable open in accordance with 110.25.

Statement of Problem and Substantiation for Public Input

With the inclusion of EVPE to the scope of this Article, the use of the term "equipment" would be ambiguous and must be replaced with the references to EVSE and WPTE in order to clarify which requirements apply to what type of equipment.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2442-NFPA 70-2017 [Section No. 90.2(A)]	
Public Input No. 2443-NFPA 70-2017 [Section No. 625.1]	
Public Input No. 2444-NFPA 70-2017 [New Definition after Definition: Electric Vehicle Storage B...]	
Public Input No. 2445-NFPA 70-2017 [Definition: Electric Vehicle Supply Equipment.]	
Public Input No. 2446-NFPA 70-2017 [Section No. 625.5]	
Public Input No. 2448-NFPA 70-2017 [Section No. 625.16]	
Public Input No. 2449-NFPA 70-2017 [New Section after 625.40]	
Public Input No. 2452-NFPA 70-2017 [Section No. 625.41]	
Public Input No. 2455-NFPA 70-2017 [Section No. 625.44]	
Public Input No. 2456-NFPA 70-2017 [Section No. 625.48]	
Public Input No. 2458-NFPA 70-2017 [Article 625]	

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Submittal Date: Fri Aug 18 12:50:23 EDT 2017

Public Input No. 4194-NFPA 70-2017 [Section No. 625.43]

625.43 Disconnecting Means.

For equipment rated more than 60 amperes or more than 150 volts to ground, the disconnecting means shall be provided ~~and installed in~~ at a readily accessible location and within sight and within 3 m (10') of the equipment . The disconnecting means shall be lockable open in accordance with 110.25.

Statement of Problem and Substantiation for Public Input

Having the required disconnect located with insight of the equipment provides a higher level of safety. The installers of EVCSs are not always a licensed electrician with OSHA lockout tagout devices available.

Submitter Information Verification

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Public Input No. 2455-NFPA 70-2017 [Section No. 625.44]

625.44 Equipment Connection.

~~Equipment shall~~ EVSE and WPTE shall be connected to the premises wiring system in accordance with one of the following:

(A) Portable ~~Equipment~~ EVSE .

~~Portable equipment~~ Portable EVSE shall be connected to the premises wiring systems by one or more of the following methods:

(1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 125 volts, single phase, 15 or 20 amperes

(2) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 250 volts, single phase, 15 or 20 amperes

(3) A nonlocking, 2-pole, 3-wire or 3-pole, 4-wire grounding-type receptacle outlet rated at 250 volts, single phase, 30 or 50 amperes

(4) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 60 volts dc maximum, 15 or 20 amperes

The length of the power supply cord, if provided, between the receptacle outlet and the equipment shall be in accordance with 625.17(A)(3).

(B) Stationary Equipment.

~~Stationary equipment intended~~ Stationary EVSE and WPTE intended to be fastened in ~~place in such a way as to permit ready removal for interchange, facilitation of maintenance or repair, or repositioning shall~~ place shall be connected to the premises wiring system by one of the following methods:

(1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated 125 volt or 250 volt, single phase, up to 50 amperes

(2) A nonlocking, 3-pole, 4-wire grounding-type receptacle outlet rated 250 volt, three phase, up to 50 amperes

(3) Any of the receptacle outlets in 625.44(A)(1) or (2)

The length of the power supply cord, if provided, between the receptacle outlet and the equipment shall be in accordance with 625.17(A)(3).

(C) Fixed Equipment.

All ~~other equipment shall~~ other EVSE and WPTE shall be permanently wired and fixed in place to the supporting surface.

Statement of Problem and Substantiation for Public Input

With the inclusion of EVPE to the scope of this Article, the use of the term “equipment” would be ambiguous and must be replaced with the references to EVSE and WPTE in order to clarify which requirements apply to what type of equipment. A further change was to omit the text “in such a way to permit ready removal for interchange, facilitation of maintenance, or repositioning” as this is already included in the definition of the term “fastened in place” and repeating it is not needed.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2442-NFPA 70-2017 [Section No. 90.2(A)]	
Public Input No. 2443-NFPA 70-2017 [Section No. 625.1]	

Public Input No. 2444-NFPA 70-2017 [New Definition after Definition: Electric Vehicle Storage B...]

Public Input No. 2445-NFPA 70-2017 [Definition: Electric Vehicle Supply Equipment.]

Public Input No. 2446-NFPA 70-2017 [Section No. 625.5]

Public Input No. 2448-NFPA 70-2017 [Section No. 625.16]

Public Input No. 2449-NFPA 70-2017 [New Section after 625.40]

Public Input No. 2452-NFPA 70-2017 [Section No. 625.41]

Public Input No. 2454-NFPA 70-2017 [Section No. 625.43]

Public Input No. 2456-NFPA 70-2017 [Section No. 625.48]

Public Input No. 2458-NFPA 70-2017 [Article 625]

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Submittal Date: Fri Aug 18 12:52:23 EDT 2017

Public Input No. 3788-NFPA 70-2017 [Section No. 625.44(A)]

(A) Portable Equipment.

Portable equipment shall be connected to the premises wiring systems by one or more of the following methods:

(1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 125 volts, single phase, 15 or 20 amperes

(2) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 250 volts, single phase, 15 or 20 amperes

(3) A nonlocking, 2-pole, 3-wire or 3-pole, 4-wire grounding-type receptacle outlet rated at 250 volts, single phase, 30 or 50 amperes

(4) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 60 volts dc maximum, 15 or 20 amperes

~~The length of the power supply cord, if provided, between the receptacle outlet and the equipment shall be in accordance with 625.17(A)(3) .~~

Statement of Problem and Substantiation for Public Input

Problem/Substantiation:
(This serves as Part 20/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

Editorial change submitted to accompany the Submitter's Proposals (Ref. PI 3388-NFPA70-2017 and PI 3397-NFPA70-2017) to delete Section 625.17(A)(3)(a) and 625.17(A)(3)(b).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3797-NFPA 70-2017 [Section No. 625.17(A)]	

Submitter Information Verification

Submitter Full Name: Craig Sato

Organization: ChargePoint, Inc.

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Submittal Date: Wed Sep 06 21:25:03 EDT 2017

Public Input No. 3963-NFPA 70-2017 [Section No. 625.44(A)]

(A) Portable Equipment.

Portable equipment shall be connected to the premises wiring systems by one or more of the following methods:

(1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 125 volts, single phase, 15 or 20 amperes

(2) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 250 volts, single phase, 15 or 20 amperes

(3) A nonlocking, 2-pole, 3-wire or 3-pole, 4-wire grounding-type receptacle outlet rated at 250 volts, single phase, 30 or 50 amperes

(4) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 60 volts dc maximum, 15 or 20 amperes

The length of the power supply cord, if provided, between the receptacle outlet and the equipment shall be in accordance with 625.17(A)(3).

Additional Proposed Changes

File Name	Description	Approved
70_17-2_1242.pdf	70_17-2_1242	✓

Statement of Problem and Substantiation for Public Input

NOTE: This public input originates from Tentative Interim Amendment No. 17-2 (Log 1242) issued by the Standards Council on December 1, 2016 and per the NFPA Regs., needs to be reconsidered by the Technical Committee for the next edition of the Document.

Substantiation. Electric vehicle (EV) manufacturers continue to extended the range of EVs and a demand exist for having the ability to charge upon reaching that extended range in order to make longer range EV use plausible. Multiple EV manufacturers testified during the NFPA Technical Session that 240V portable charging is a must in order to support the sale and deployment of longer range EVs with new models being launched in 2016. The language to explicitly permit 240V EV Portable Chargers in Article 625 was declined by CMP-12 and the NFPA Membership at the Technical Session. The two primary reasons were to address the electrical safety of a person plugging and unplugging a 250V cord cap into a receptacle in a wet or damp environment by requiring GFCI and the need for an in-use cover for 250V receptacle outlets serving EV charging equipment. The 2017 NEC partially addressed the GFCI protection requirement for 250V receptacles in locations other than dwellings (NEC 210.8(B)). This proposal seeks to address the GFCI protection gap along with the in-use cover in order to support the inclusion of 240V portable EV charging in NEC 625.44(A).

Emergency Nature. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action. The introduction of longer range EVs this year (2016) accompanied by 240V portable chargers means the NEC needs to recognize the chargers and address public safety interface concerns that can be accomplished today. The 2017 NEC will create an unnecessary hardship on the Electric Vehicle industry by failing to recognize and address the safety concerns voiced at the NFPA Technical Session. The technology exists to address these safety concerns. CMP-2 actually introduced GFCI protection on 250V receptacle outlets and then removed it from dwellings units. This TIA proposes to recognize the EV 250V portable charging technology in order to alleviate a hardship on the EV industry while addressing the publicly conveyed safety concerns by introducing the GFCI protection and in-use cover requirements on the receptacle outlets for EV charging. The 2017 NEC must recognize the needs of the EV industry by addressing the safety concerns to support the technology and not wait another 3 years.

Submitter Information Verification

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Submittal Date: Thu Sep 07 10:45:40 EDT 2017

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Tentative Interim Amendment

NFPA® 70®

National Electrical Code®

2017 Edition

Reference: 625.44(A), 625.54(New) and 625.56(New)
TIA 17-2
(SC 16-11-3 / TIA Log #1242)

Pursuant to Section 5 of the NFPA *Regulations Governing the Development of NFPA Standards*, the National Fire Protection Association has issued the following Tentative Interim Amendment to NFPA 70, *National Electrical Code®*, 2017 edition. The TIA was processed by the NEC Code-Making Panel 12 and the Correlating Committee on the National Electrical Code, and was issued by the Standards Council on December 1, 2016, with an effective date of December 21, 2016.

A Tentative Interim Amendment is tentative because it has not been processed through the entire standards-making procedures. It is interim because it is effective only between editions of the standard. A TIA automatically becomes a public input of the proponent for the next edition of the standard; as such, it then is subject to all of the procedures of the standards-making process.

1. Revise 625.44(A) to read as follows:

625.44(A) Portable Equipment. Portable equipment shall be connected to the premises wiring systems by one or more of the following methods:

(1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 125 volts, single phase, 15 or 20 amperes
(2) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 250 volts, single phase, 15 or 20 amperes
(3) A nonlocking, 2-pole, 3-wire or 3-pole, 4-wire grounding-type receptacle outlet rated at 250 volts, single phase, 30 or 50 amperes
(4) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 60 volts dc maximum, 15 or 20 amperes

The length of the power supply cord, if provided, between the receptacle outlet and the equipment shall be in accordance with 625.17(A) (3).

2. Add a new 625.54 to read as follows:

625.54 Ground-Fault Circuit-Interrupter Protection for Personnel. All single-phase receptacles installed for the connection of electric vehicle charging that are rated 150 volts to ground or less, and 50 amperes or less shall have ground-fault circuit-interrupter protection for personnel.

3. Add a new 625.56 to read as follows:

625.56 Receptacle Enclosures. All receptacles installed in a wet location for electric vehicle charging shall have an enclosure that is weatherproof with the attachment plug cap inserted or removed.

Issue Date: December 1, 2016

Effective Date: December 21, 2016

(Note: For further information on NFPA Codes and Standards, please see www.nfpa.org/docinfo**)**

Public Input No. 2469-NFPA 70-2017 [Section No. 625.44(B)]

(B) Stationary Equipment.

Stationary equipment intended to be fastened in place in such a way as to permit ready removal for interchange, facilitation of maintenance or repair, or repositioning shall be connected to the premises wiring system by one of the following methods:

(1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated 125 volt or 250 volt, single phase, up to 50 amperes

(2) A nonlocking, 3-pole, 4-wire grounding-type receptacle outlet rated 250 volt, three phase, up to 50 amperes

(3) ~~Any of the receptacle outlets in 625.44(A) (1) or (2)~~ A nonlocking, 3-pole, 4-wire grounding-type receptacle outlet rated 250 volt, single phase, 30 or 50 amperes

(4) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated 60 volt dc maximum, 15 or 20 amperes

The length of the power supply cord, if provided, between the receptacle outlet and the equipment shall be in accordance with 625.17(A)(3).

Statement of Problem and Substantiation for Public Input

With the publication of TIA 17-2 to the 2017 edition of the NEC, revision to 625.44(A) occurred. This allowed portable devices to be connected using a 250 volt, single phase, 30 or 50 ampere receptacle as indicated in item 2 to this proposal. If that is suitable for portable devices, it is suitable for fastened in place devices. Further, the original item 3 of 625.44(B) stated that “any of the receptacles in 625.44(A)(1) or (2)” were allowed. This is no longer correct based on the TIA as it should read the receptacle in 625.44(A)(4) is allowed. Rather than stating that, it is easier to copy the text into item 4 of this proposed revision.

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Submittal Date: Fri Aug 18 14:49:41 EDT 2017

Public Input No. 2847-NFPA 70-2017 [Section No. 625.44(B)]

(B) Stationary Equipment.

Stationary equipment intended to be fastened in place in such a way as to permit ready removal for interchange, facilitation of maintenance or repair, or repositioning shall be connected to the premises wiring system by one of the following methods:

(1) A ~~nonlocking,~~ 2-pole, 3-wire grounding-type receptacle outlet rated 125 volt or 250 volt, single phase, up to 50 amperes

(2) A ~~nonlocking,~~ 3-pole, 4-wire grounding-type receptacle outlet rated 250 volt, three phase, up to 50 amperes

(3) Any of the receptacle outlets in 625.44(A)(1) or (2)

The length of the power supply cord, if provided, between the receptacle outlet and the equipment shall be in accordance with 625.17(A)(3).

Additional Proposed Changes

File Name	Description	Approved
625.44_B_5evse.docx	625.44(B) Illustration shows two listed EVSE products, one stationary and the fixed.	✓

Statement of Problem and Substantiation for Public Input

If any type of plug/receptacle outlet (locking or nonlocking) for a fixed in place EVSE with permanent wiring is acceptable, then it should be equally safe to use any type of plug/ receptacle outlet for a stationary EVSE since it also has to be mounted to the wall. From this standpoint, as a practical matter, there is little difference between stationary and fixed in place equipment.
The automatic de-energization of the cable described in section 625.19 should be the fail-safe output cable de-energization mechanism in case the EVSE is accidentally pulled from its mounting fixture during charging and not the input plug-receptacle connection. That de-energization mechanism is logical for portable EVSEs.

The illustration below shows two listed EVSE products, one Stationary and the other Fixed. Note that both are mounted to the wall using the same mechanism.

Submitter Information Verification

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Copyright Assignment

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Public Input No. 3790-NFPA 70-2017 [Section No. 625.44(B)]

(B) Stationary Equipment.

Stationary equipment intended to be fastened in place in such a way as to permit ready removal for interchange, facilitation of maintenance or repair, or repositioning shall be connected to the premises wiring system by one of the following methods:

(1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated 125 volt or 250 volt, single phase, up to 50 amperes

(2) A nonlocking, 3-pole, 4-wire grounding-type receptacle outlet rated 250 volt, three phase, up to 50 amperes

(3) Any of the receptacle outlets in 625.44(A)(1) or (2)

~~The length of the power supply cord, if provided, between the receptacle outlet and the equipment shall be in accordance with 625.17(A)(3) .~~

Statement of Problem and Substantiation for Public Input

Problem/Substantiation:
(This serves as Part 21/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

Editorial change submitted to accompany the Submitter's Proposals (Ref. PI 3388-NFPA70-2017 and PI 3397-NFPA70-2017) to delete Section 625.17(A)(3)(a) and 625.17(A)(3)(b).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3797-NFPA 70-2017 [Section No. 625.17(A)]	

Submitter Information Verification

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Submittal Date: Wed Sep 06 21:28:08 EDT 2017

Public Input No. 609-NFPA 70-2017 [Section No. 625.44(B) Stationary Eq...]

(B) ~~Stationary Equipment.~~

~~Stationary equipment intended to be fastened in place in such a way as to permit ready removal for interchange, facilitation of maintenance or repair, or repositioning shall~~

Fastened in Place Equiment.

Equipment that is fastened in place shall be connected to the premises wiring system by one of the following methods:

(1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated 125 volt or 250 volt, single phase, up to 50 amperes

(2) A nonlocking, 3-pole, 4-wire grounding-type receptacle outlet rated 250 volt, three phase, up to 50 amperes

(3) Any of the receptacle outlets in 625.44(A)(1) or (2)

The length of the power supply cord, if provided, between the receptacle outlet and the equipment shall be in accordance with 625.17(A)(3).

Statement of Problem and Substantiation for Public Input

"Stationary" is not defined; however, 625.44(B) uses the definition for "fastened in place" to describe stationary equipment. By changing "Stationary Equipment" to "Fastened in Place Equipment" it clarifies the type of equipment by the definition in 625.2 and also makes 625.44(B) more concise.

Submitter Information Verification

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Organization: Independent Electrical Contractors

Affilliation: Independent Electrical Contractors Codes and Standard

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Submittal Date: Wed Apr 26 21:25:49 EDT 2017

Public Input No. 2456-NFPA 70-2017 [Section No. 625.48]

625.48 Interactive Systems.

~~Electric vehicle supply equipment~~ EVSE that incorporates a power export function, that is part of an interactive system that serves as an optional standby system, an electric power production source, or a bidirectional power feed shall be listed, evaluated for use with the specific electric vehicles, and marked as suitable for that purpose. When used as an optional standby system, the requirements of Article 702 shall apply; when used as an electric power production source, the requirements of Article 705 shall apply. EVPE that consists of a receptacle outlet only shall be in accordance with 625.new.

Informational Note: For further information on supply equipment, see ANSI/UL 1741, *Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources*, and ANSI/UL 9741, *Bidirectional Electric Vehicle (EV) Charging System Equipment*; for vehicle interactive systems, see SAE J3072, *Standard for Interconnection Requirements for Onboard, Utility-Interactive Inverter Systems*.

Statement of Problem and Substantiation for Public Input

The changes are required to clarify that EVSE are unidirectional (to the vehicle) and that a product must be EVPE or a bi-directional EVSE (EVSE provided with a power export function) or provided as a receptacle on the vehicle in order to be able to perform the power export function. This proposal also uses the various acronyms to identify the types of equipment referenced.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2442-NFPA 70-2017 [Section No. 90.2(A)]	
Public Input No. 2443-NFPA 70-2017 [Section No. 625.1]	
Public Input No. 2444-NFPA 70-2017 [New Definition after Definition: Electric Vehicle Storage B...]	
Public Input No. 2445-NFPA 70-2017 [Definition: Electric Vehicle Supply Equipment.]	
Public Input No. 2446-NFPA 70-2017 [Section No. 625.5]	
Public Input No. 2448-NFPA 70-2017 [Section No. 625.16]	
Public Input No. 2449-NFPA 70-2017 [New Section after 625.40]	
Public Input No. 2452-NFPA 70-2017 [Section No. 625.41]	
Public Input No. 2454-NFPA 70-2017 [Section No. 625.43]	
Public Input No. 2455-NFPA 70-2017 [Section No. 625.44]	
Public Input No. 2458-NFPA 70-2017 [Article 625]	

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Public Input No. 2470-NFPA 70-2017 [Section No. 625.50]

625.50 Location.

The ~~electric vehicle supply equipment~~ EVSE shall be located for direct electrical coupling of the EV connector (conductive or inductive) to the electric vehicle. Unless specifically listed and marked for the location, the coupling means of ~~the electric vehicle supply equipment~~ the EVSE shall be stored or located at a height of not less than 450 mm (18 in.) above the floor level for indoor locations or 600 mm (24 in.) above the grade level for outdoor locations. This requirement does not apply to ~~portable electric vehicle supply equipment constructed~~ portable EVSE intended for connection to receptacle outlets in accordance with 625.44(A).

Statement of Problem and Substantiation for Public Input

The EVSE is not constructed in accordance with 625.44(A) as originally indicated. That reference simply lists the receptacle outlets to which the EVSE can be connected. Therefore, this clarification states that the EVSE is intended for connection to receptacle outlets in accordance with 625.44(A)(1) which points to the 125 volt, 15 or 20 ampere receptacles that the embedded exception was intending to point to. This proposal also uses the various acronyms to identify the types of equipment referenced.

Submitter Information Verification

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Zip:

Submittal Date: Fri Aug 18 14:55:01 EDT 2017

Public Input No. 2865-NFPA 70-2017 [Section No. 625.50]

625.50 Location.

The electric vehicle supply equipment shall be located for direct electrical coupling of the EV connector (conductive or inductive) to the electric vehicle. Unless specifically listed and marked for the location, the coupling means of the electric vehicle supply equipment shall be stored or located at a height of not less than 450 mm (18 in.) above the floor level for indoor locations or 600 mm (24 in.) above the grade level for outdoor locations. This requirement does not apply to portable electric vehicle supply equipment constructed in accordance with 625.44(A). <u>Electric vehicle supply equipment installed outdoor at other than 1 & 2 family dwellings shall be protected from accidental contact from vehicle impact</u>

-

Statement of Problem and Substantiation for Public Input

Installations of electric vehicle supply equipment installed outdoors at car dealers, parking lots and other locations that are accessible to the public create a potential of accidental contact, requiring vehicle impact protection will reduce the potential of accidental contact with the electric vehicle supply equipment

Submitter Information Verification

Submitter Full Name: Michael Dempsey

Organization: Trinity Code Inpsections

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Submittal Date: Mon Aug 28 14:00:48 EDT 2017

Public Input No. 2868-NFPA 70-2017 [New Section after 625.50]

TITLE OF NEW CONTENT

illumination- Electric vehicle supply equipment installed at outdoor locations other than 1 & 2 family dwelling that are accessible to the public shall be provided with illumination at the area of the electric vehicle supply equipment when sufficient daylight is not available, the control of the illumination shall be permitted to be remote or automatic control

Statement of Problem and Substantiation for Public Input

requiring illumination at the electric vehicle supply equipment will provide safety and security to the public using electric vehicle supply equipment at night hours at remote or unoccupied areas

Submitter Information Verification

Submitter Full Name: Michael Dempsey

Organization: Trinity Code Inspections

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Submittal Date: Mon Aug 28 14:51:36 EDT 2017

Public Input No. 3779-NFPA 70-2017 [Section No. 625.52(A)]

(A) Ventilation Not Required.

Where electric vehicle storage batteries are used or where the equipment is listed for charging electric vehicles indoors without ventilation ~~and marked in accordance with 625.15(B)~~ , mechanical ventilation shall not be required.

Statement of Problem and Substantiation for Public Input

Problem/Substantiation:
(This serves as Part 22/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

Editorial change submitted to accompany the Submitter's Proposal (Ref. PI 3366-NFPA70-2017) to delete Section 625.15(B).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3366-NFPA 70-2017 [Section No. 625.15(B)]	

Submitter Information Verification

Submitter Full Name: Craig Sato

Organization: ChargePoint, Inc.

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Submittal Date: Wed Sep 06 21:14:09 EDT 2017

Public Input No. 3785-NFPA 70-2017 [Section No. 625.52(B) [Excluding any Sub-Sections]]

Where the equipment is listed for charging electric vehicles that require ventilation for indoor charging, ~~and is marked in accordance with 625.15(C)~~ , mechanical ventilation, such as a fan, shall be provided. The ventilation shall include both supply and exhaust equipment and shall be permanently installed and located to intake from, and vent directly to, the outdoors. Positive-pressure ventilation systems shall be permitted only in vehicle charging buildings or areas that have been specifically designed and approved for that application. Mechanical ventilation requirements shall be determined by one of the methods specified in 625.52(B)(1) through (B)(4).

Statement of Problem and Substantiation for Public Input

Problem/Substantiation:
(This serves as Part 23/23 of a set of PI's intended to address the presence of construction requirements in Article 625 for EVSE conductively coupled to the EV.)

Editorial change submitted to accompany the Submitter's Proposal (Ref. PI 3369-NFPA70-2017) to delete Section 625.15(C).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3369-NFPA 70-2017 [Section No. 625.15(C)]	

Submitter Information Verification

Submitter Full Name: Craig Sato
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Submittal Date: Wed Sep 06 21:19:05 EDT 2017

Public Input No. 3964-NFPA 70-2017 [New Section after 625.50]

625.54 Ground-Fault Circuit-Interrupter Protection for Personnel. All single-phase receptacles installed for the connection of electric vehicle charging that are rated 150 volts to ground or less, and 50 amperes of less shall have ground-fault circuit-interrupter protection for personnel.

Additional Proposed Changes

File Name	Description	Approved
70_17-2_1242.pdf	70_17-2_1242	✓

Statement of Problem and Substantiation for Public Input

NOTE: This public input originates from Tentative Interim Amendment No. 17-2 (Log 1242) issued by the Standards Council on December 1, 2016 and per the NFPA Regs., needs to be reconsidered by the Technical Committee for the next edition of the Document.

Substantiation. Electric vehicle (EV) manufacturers continue to extended the range of EVs and a demand exist for having the ability to charge upon reaching that extended range in order to make longer range EV use plausible. Multiple EV manufacturers testified during the NFPA Technical Session that 240V portable charging is a must in order to support the sale and deployment of longer range EVs with new models being launched in 2016. The language to explicitly permit 240V EV Portable Chargers in Article 625 was declined by CMP-12 and the NFPA Membership at the Technical Session. The two primary reasons were to address the electrical safety of a person plugging and unplugging a 250V cord cap into a receptacle in a wet or damp environment by requiring GFCI and the need for an in-use cover for 250V receptacle outlets serving EV charging equipment. The 2017 NEC partially addressed the GFCI protection requirement for 250V receptacles in locations other than dwellings (NEC 210.8(B)). This proposal seeks to address the GFCI protection gap along with the in-use cover in order to support the inclusion of 240V portable EV charging in NEC 625.44(A).

Emergency Nature. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action. The introduction of longer range EVs this year (2016) accompanied by 240V portable chargers means the NEC needs to recognize the chargers and address public safety interface concerns that can be accomplished today. The 2017 NEC will create an unnecessary hardship on the Electric Vehicle industry by failing to recognize and address the safety concerns voiced at the NFPA Technical Session. The technology exists to address these safety concerns. CMP-2 actually introduced GFCI protection on 250V receptacle outlets and then removed it from dwellings units. This TIA proposes to recognize the EV 250V portable charging technology in order to alleviate a hardship on the EV industry while addressing the publicly conveyed safety concerns by introducing the GFCI protection and in-use cover requirements on the receptacle outlets for EV charging. The 2017 NEC must recognize the needs of the EV industry by addressing the safety concerns to support the technology and not wait another 3 years.

Submitter Information Verification

Submitter Full Name: CMP ON NEC-P12

Organization: Code-Making Panel 12

Street Address:

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State:

Zip:

Submittal Date: Thu Sep 07 10:49:56 EDT 2017

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Tentative Interim Amendment

NFPA® 70®

National Electrical Code®

2017 Edition

Reference: 625.44(A), 625.54(New) and 625.56(New)
TIA 17-2
(SC 16-11-3 / TIA Log #1242)

Pursuant to Section 5 of the NFPA *Regulations Governing the Development of NFPA Standards*, the National Fire Protection Association has issued the following Tentative Interim Amendment to NFPA 70, *National Electrical Code®*, 2017 edition. The TIA was processed by the NEC Code-Making Panel 12 and the Correlating Committee on the National Electrical Code, and was issued by the Standards Council on December 1, 2016, with an effective date of December 21, 2016.

A Tentative Interim Amendment is tentative because it has not been processed through the entire standards-making procedures. It is interim because it is effective only between editions of the standard. A TIA automatically becomes a public input of the proponent for the next edition of the standard; as such, it then is subject to all of the procedures of the standards-making process.

1. Revise 625.44(A) to read as follows:

625.44(A) Portable Equipment. Portable equipment shall be connected to the premises wiring systems by one or more of the following methods:

(1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 125 volts, single phase, 15 or 20 amperes
(2) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 250 volts, single phase, 15 or 20 amperes
(3) A nonlocking, 2-pole, 3-wire or 3-pole, 4-wire grounding-type receptacle outlet rated at 250 volts, single phase, 30 or 50 amperes
(4) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 60 volts dc maximum, 15 or 20 amperes

The length of the power supply cord, if provided, between the receptacle outlet and the equipment shall be in accordance with 625.17(A) (3).

2. Add a new 625.54 to read as follows:

625.54 Ground-Fault Circuit-Interrupter Protection for Personnel. All single-phase receptacles installed for the connection of electric vehicle charging that are rated 150 volts to ground or less, and 50 amperes or less shall have ground-fault circuit-interrupter protection for personnel.

3. Add a new 625.56 to read as follows:

625.56 Receptacle Enclosures. All receptacles installed in a wet location for electric vehicle charging shall have an enclosure that is weatherproof with the attachment plug cap inserted or removed.

Issue Date: December 1, 2016

Effective Date: December 21, 2016

(Note: For further information on NFPA Codes and Standards, please see www.nfpa.org/docinfo**)**

Public Input No. 3966-NFPA 70-2017 [New Section after 625.50]

625.56 Receptacle Enclosures.

All receptacles installed in a wet location for electric vehicle charging shall have an enclosure that is weatherproof with the attachment plug cap inserted or removed.

Additional Proposed Changes

File Name	Description	Approved
70_17-2_1242.pdf	70_17-2_1242	✓

Statement of Problem and Substantiation for Public Input

NOTE: This public input originates from Tentative Interim Amendment No. 17-2 (Log 1242) issued by the Standards Council on December 1, 2016 and per the NFPA Regs., needs to be reconsidered by the Technical Committee for the next edition of the Document.

Substantiation. Electric vehicle (EV) manufacturers continue to extended the range of EVs and a demand exist for having the ability to charge upon reaching that extended range in order to make longer range EV use plausible. Multiple EV manufacturers testified during the NFPA Technical Session that 240V portable charging is a must in order to support the sale and deployment of longer range EVs with new models being launched in 2016. The language to explicitly permit 240V EV Portable Chargers in Article 625 was declined by CMP-12 and the NFPA Membership at the Technical Session. The two primary reasons were to address the electrical safety of a person plugging and unplugging a 250V cord cap into a receptacle in a wet or damp environment by requiring GFCI and the need for an in-use cover for 250V receptacle outlets serving EV charging equipment. The 2017 NEC partially addressed the GFCI protection requirement for 250V receptacles in locations other than dwellings (NEC 210.8(B)). This proposal seeks to address the GFCI protection gap along with the in-use cover in order to support the inclusion of 240V portable EV charging in NEC 625.44(A).

Emergency Nature. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action. The introduction of longer range EVs this year (2016) accompanied by 240V portable chargers means the NEC needs to recognize the chargers and address public safety interface concerns that can be accomplished today. The 2017 NEC will create an unnecessary hardship on the Electric Vehicle industry by failing to recognize and address the safety concerns voiced at the NFPA Technical Session. The technology exists to address these safety concerns. CMP-2 actually introduced GFCI protection on 250V receptacle outlets and then removed it from dwellings units. This TIA proposes to recognize the EV 250V portable charging technology in order to alleviate a hardship on the EV industry while addressing the publicly conveyed safety concerns by introducing the GFCI protection and in-use cover requirements on the receptacle outlets for EV charging. The 2017 NEC must recognize the needs of the EV industry by addressing the safety concerns to support the technology and not wait another 3 years.

Submitter Information Verification

Submitter Full Name: CMP ON NEC-P12

Organization: Code-Making Panel 12

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Submittal Date: Thu Sep 07 10:53:45 EDT 2017

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Tentative Interim Amendment

NFPA® 70®

National Electrical Code®

2017 Edition

Reference: 625.44(A), 625.54(New) and 625.56(New)
TIA 17-2
(SC 16-11-3 / TIA Log #1242)

Pursuant to Section 5 of the NFPA *Regulations Governing the Development of NFPA Standards*, the National Fire Protection Association has issued the following Tentative Interim Amendment to NFPA 70, *National Electrical Code®*, 2017 edition. The TIA was processed by the NEC Code-Making Panel 12 and the Correlating Committee on the National Electrical Code, and was issued by the Standards Council on December 1, 2016, with an effective date of December 21, 2016.

A Tentative Interim Amendment is tentative because it has not been processed through the entire standards-making procedures. It is interim because it is effective only between editions of the standard. A TIA automatically becomes a public input of the proponent for the next edition of the standard; as such, it then is subject to all of the procedures of the standards-making process.

1. Revise 625.44(A) to read as follows:

625.44(A) Portable Equipment. Portable equipment shall be connected to the premises wiring systems by one or more of the following methods:

(1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 125 volts, single phase, 15 or 20 amperes
(2) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 250 volts, single phase, 15 or 20 amperes
(3) A nonlocking, 2-pole, 3-wire or 3-pole, 4-wire grounding-type receptacle outlet rated at 250 volts, single phase, 30 or 50 amperes
(4) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 60 volts dc maximum, 15 or 20 amperes

The length of the power supply cord, if provided, between the receptacle outlet and the equipment shall be in accordance with 625.17(A) (3).

2. Add a new 625.54 to read as follows:

625.54 Ground-Fault Circuit-Interrupter Protection for Personnel. All single-phase receptacles installed for the connection of electric vehicle charging that are rated 150 volts to ground or less, and 50 amperes or less shall have ground-fault circuit-interrupter protection for personnel.

3. Add a new 625.56 to read as follows:

625.56 Receptacle Enclosures. All receptacles installed in a wet location for electric vehicle charging shall have an enclosure that is weatherproof with the attachment plug cap inserted or removed.

Issue Date: December 1, 2016

Effective Date: December 21, 2016

(Note: For further information on NFPA Codes and Standards, please see www.nfpa.org/docinfo**)**

Public Input No. 667-NFPA 70-2017 [Section No. 625.56]

625.56 Receptacle Enclosures.

All receptacles installed in a wet location for electric vehicle charging shall have an enclosure that is weatherproof with the attachment plug cap inserted or removed. An outlet box hood installed for this purpose shall be listed and shall be indentified as "extra-duty." Other listed products, enclosures, or assemblies providing weatherproof protection that do not utilize an outlet box hood need not be marked "extra duty."

Statement of Problem and Substantiation for Public Input

This proposed change would create consistency within the National Electrical Code, and give Article 625 charging receptacles the same degree of protection as seen in Article 406.9(B), for 15 and 20 ampere receptacles installed in a wet location.

Submitter Information Verification

Submitter Full Name: Nick Sasso

Organization: State of Wyoming

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City:

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Submittal Date: Sun May 07 16:12:56 EDT 2017

Public Input No. 2039-NFPA 70-2017 [Section No. 625.101]

625.101 Equipment Grounding Conductor.

The primary pad base plate shall be of a non-ferrous metal and shall be ~~grounded~~ connected to the circuit equipment grounding conductor unless the listed WPTE employs a double-insulation system. The base plate shall be sized to match the size of the primary pad enclosure.

Statement of Problem and Substantiation for Public Input

New title to reflect the content of the rule EGC, not grounding.

Submitter Information Verification

Submitter Full Name:	Mike Holt
Organization:	Mike Holt Enterprises Inc
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Wed Aug 09 15:59:46 EDT 2017

Public Input No. 442-NFPA 70-2017 [Section No. 625.102]

625. ~~102 Construction~~ 102 Installation .

(A) Type.

The charger power converter, where integral to the primary pad, shall comply with 625.102(C). The charger power converter, if not integral to the primary pad, shall be provided with a minimum Type 3R enclosure rating.

(B) ~~Installation~~ General .

If the charger power converter is not integral to the primary pad, it shall be mounted at a height of not less than 450 mm (18 in.) above the floor level for indoor locations or 600 mm (24 in.) above grade level for outdoor locations. The charger power converter shall be mounted in one of the following forms:

(1) Pedestal

(2) Wall or pole

(3) Building or structure

(4) Raised concrete pad

(C) Primary Pad.

The primary pad shall be installed on the surface, embedded in the surface of the floor with its top flush with the surface, or embedded in the surface of the floor with its top below the surface. This includes primary pad constructions with the charger power converter located in the primary pad enclosure.

(1) If the primary pad is located in an area requiring snow removal, it shall not be located on or above the surface.

Exception: Where installed on private property where snow removal is done manually, the primary pad shall be permitted to be located on or above the surface.

(2) The enclosure shall be provided with a suitable enclosure rating minimum Type 3. If the primary pad is located in an area subject to severe climatic conditions (e.g., flooding), it shall be suitably rated for those conditions or be provided with a suitably rated enclosure.

(D) Protection of the Output Cable.

The output cable to the primary pad shall be secured in place over its entire length for the purpose of restricting its movement and to prevent strain at the connection points. If installed in conditions where drive-over could occur, the cable shall be provided with supplemental protection. Where the charger power converter is a part of the primary pad assembly, the power supply cord to the primary pad shall also be protected.

(E) Other Wiring Systems.

Other wiring systems and fittings specifically listed for use on the WPTE shall be permitted.

Statement of Problem and Substantiation for Public Input

This section doesn't appear to really deal with the construction of the equipment, but rather the installation.

Submitter Information Verification

Submitter Full Name: Ryan Jackson

Organization: Ryan Jackson

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Submittal Date: Fri Mar 31 13:53:25 EDT 2017

Copyright Assignment

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Public Input No. 1914-NFPA 70-2017 [Section No. 626.2]

626.2 Definitions. The definitions in this section shall apply only within this article.

Cable Management System (Electrified Truck Parking Spaces).

An apparatus designed to control and organize unused lengths of cable or cord at electrified truck parking spaces.

Cord Connector.

A device that, by inserting it into a truck flanged surface inlet, establishes an electrical connection to the truck for the purpose of providing power for the on-board electric loads and may provide a means for information exchange. This device is part of the truck coupler.

Disconnecting Means, Parking Space.

The necessary equipment usually consisting of a circuit breaker or switch and fuses, and their accessories, located near the point of entrance of supply conductors in an electrified truck parking space and intended to constitute the means of cutoff for the supply to that truck.

Electrified Truck Parking Space.

A truck parking space that has been provided with an electrical system that allows truck operators to connect their vehicles while stopped and to use off-board power sources in order to operate on-board systems such as air conditioning, heating, and appliances, without any engine idling.

> Informational Note: An electrified truck parking space also includes dedicated parking areas for heavy-duty trucks at travel plazas, warehouses, shipper and consignee yards, depot facilities, and border crossings. It does not include areas such as the shoulders of highway ramps and access roads, camping and recreational vehicle sites, residential and commercial parking areas used for automotive parking or other areas where ac power is provided solely for the purpose of connecting automotive and other light electrical loads, such as engine block heaters, and at private residences.

Electrified Truck Parking Space Wiring Systems.

All of the electrical wiring, equipment, and appurtenances related to electrical installations within an electrified truck parking space, including the electrified parking space supply equipment.

Overhead Gantry.

A structure consisting of horizontal framework, supported by vertical columns spanning above electrified truck parking spaces, that supports equipment, appliances, raceway, and other necessary components for the purpose of supplying electrical, HVAC, internet, communications, and other services to the spaces.

Separable Power Supply Cable Assembly.

A flexible cord or cable, including ungrounded, grounded, and equipment grounding conductors, provided with a cord connector, an attachment plug, and all other fittings, grommets, or devices installed for the purpose of delivering energy from the source of electrical supply to the truck or TRU flanged surface inlet.

Transport Refrigerated Unit (TRU).

A trailer or container, with integrated cooling or heating, or both, used for the purpose of maintaining the desired environment of temperature-sensitive goods or products.

Truck.

A motor vehicle designed for the transportation of goods, services, and equipment.

Truck Coupler.

A truck flanged surface inlet and mating cord connector.

Truck Flanged Surface Inlet.

The device(s) on the truck into which the connector(s) is inserted to provide electric energy and other services. This device is part of the truck coupler. For the purposes of this article, the truck flanged surface inlet is considered to be part of the truck and not part of the electrified truck parking space supply equipment.

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of task group appointed by the NEC Correlating Committee. This task group was appointed to identify potential issues in the NEC with respect to how definitions in both Article 100 and the XXX.2 sections of this Code apply. The member of the task group are: David Hittinger, Rich Holub, Chris Hunter, Dave Williams, Chris Porter, Alan Manche, Ken Boyce, John Kovacik, Donny Cook, Dave Kendall and Jim Dollard.

Section 2.2.2.1 of the NEC Style Manual requires that in general definitions that appear in two or more articles be located in Article 100. Section 2.2.2.2 requires that where an individual article contains definition(s), they be located in the second section (XXX.2) of the article. It is extremely important to note that the style manual does not prohibit a definition in the second section of an article from applying elsewhere in the NEC. The style manual clearly states that in general definitions that appear in two or more articles shall be located in Article 100. This has confused many code users in the past. This style manual requirement is accurate and these public inputs are simply an attempt to provide needed clarity. See the example below:

344.2 Definition.
Rigid Metal Conduit (RMC). A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.

The definition of the term “rigid metal conduit” is appropriately located in the article that contains general, installation and construction specifications for this raceway. It is commonly understood that the term “rigid metal conduit” is used in more than one article. There are many articles that contain a single definition that is necessary for application of the contained requirements but will apply elsewhere in the NEC. This occurs in articles that address cable assemblies, raceways, systems and more.
This public input seeks to delete the last sentence in the first paragraph, as it is unnecessary. A new sentence is proposed to simply inform the user of the code that definitions are also found in the second section (XXX.2) of other articles.
This public input is supplemented with proposed revisions to the second section (XXX.2) of articles that contain definitions. New parent text is proposed for these sections to increase clarity and usability. There are two different scenarios that will be addressed. First, any second section (XXX.2) that contains definitions that apply only within that article will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply only within this article.

Second, any second section (XXX.2) that contains definitions that apply within the individual article and throughout the code will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply within this article and throughout the code.

In a few cases, in the second section (XXX.2) of an Article there are definitions that will apply only in that Article and some that will apply in that Article and throughout the code. New parent text and first level subdivisions are proposed to achieve clarity and usability The combination of these proposed revisions will provide necessary clarity and usability with respect to application of definitions. These actions will also achieve compliance with the NEC Style Manual.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1202-NFPA 70-2017 [Article 100 [Excluding any Sub-Sections]]	

Submitter Information Verification

Submitter Full Name: James Dollard
Organization: IBEW Local Union 98
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 08 13:14:53 EDT 2017

Copyright Assignment

Public Input No. 3762-NFPA 70-2017 [Section No. 626.4(A)]

(A) Not Covered.

The provisions of this article shall not apply to

~~that~~

the areas specified in 626.4(A)(1) or 626.4(A)(2).

(1) The portion of other equipment in residential, commercial, or industrial facilities that requires electric power used to load and unload cargo, operate conveyors, and for other equipment used on the site or truck.

(2) Private facilities which only connect and supply power to their own dedicated trucking fleet.

Statement of Problem and Substantiation for Public Input

Private facilities which only utilize and supply power to a dedicated trucking fleet can have custom configurations and supply ratings based on the application and should be permitted to follow the general NEC rules for compliance.

Submitter Information Verification

Submitter Full Name: Chad Kennedy

Organization: Schneider Electric

Street Address:

City:

State:

Zip:

Submittal Date: Wed Sep 06 20:44:37 EDT 2017

Public Input No. 3681-NFPA 70-2017 [Section No. 626.11(B)]

(B) Demand Factors.

Electrified truck parking space electrical wiring system demand factors shall be based upon the climatic temperature zone in which the equipment is installed. The demand factors set forth in Table 626.11(B) shall be the minimum allowable demand factors that shall be permitted for calculating load for service and feeders. No demand factor shall be allowed for any other load, except as provided in this article.

Table 626.11(B) Demand Factors for Services and Feeders

Climatic Temperature Zone (USDA Hardiness Zone) See Note	Demand Factor (%)
1	70%
2a	67%
2b	62%
3a	59%
3b	57%
4a	55%
4b	51%
5a	47%
5b	43%
6a	39%
6b	34%
7a	29%
7b	24%
8a	21%
8b	20%
9a	20%
9b	20%
10a	21%
10b	23%
11	24%

Note: The climatic temperature zones shown in Table 626.11(B) correlate with those found on the “USDA Plant Hardiness Zone Map,” and the climatic temperature zone selected for use with the table shall be determined through the use of this map based on the installation location.

Informational Note: The U.S. Department of Agriculture (USDA) has developed a commonly used “Plant Hardiness Zone” map that is publicly available. The map provides guidance for determining the Climatic Temperature Zone. Data indicate that the HVAC has the highest power requirement in cold climates, with the heating demand representing the greatest load, which in turn is dependent on outside temperature. In very warm climates, where no heating load is necessary, the cooling load increases as the outdoor temperature rises. These demand factors apply to the Truck Parking Space to supply the loads for the vehicle driver's cab. They do not apply to the portion of electrical wiring systems that supply the Transport Refrigerated Units (TRUs).

Statement of Problem and Substantiation for Public Input

The demand factors shown in Table 626.11(B) for the vehicle cab have also been applied to the wiring system providing power for the Transport Refrigerated Units (TRUs).
In warm climates and during times when daytime ambient temperatures exceed 100 degree F, the duty cycle may approach 100 percent especially for frozen foods are concerned resulting the overloading of the supply circuits.
The Note makes it clear that the demand factors should apply only to the supply for the vehicle (driver's) cab.

Submitter Information Verification

Submitter Full Name:	Gregory C Nieminski
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Submittal Date:	Wed Sep 06 17:01:19 EDT 2017

Public Input No. 1956-NFPA 70-2017 [Section No. 626.11(D)]

(D) Conductor Rating.

Truck space branch-circuit supplied loads shall be considered to be continuous. Branch-circuit conductors shall be sized in accordance with 210.19(A) and have ov ercurrent protection in accordance with 210.20.

Statement of Problem and Substantiation for Public Input

Add reference to rules to help the Code user apply the requirements.

Submitter Information Verification

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Organization: Mike Holt Enterprises Inc
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City:
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Submittal Date: Wed Aug 09 11:57:39 EDT 2017

Public Input No. 725-NFPA 70-2017 [Section No. 626.24(B)]

(B) Receptacle.

All receptacles shall be listed and of the grounding type. Every truck parking space with electrical supply shall be equipped with (B)(1) and (B)(2).

(1) A maximum of three receptacles, each 2-pole, 3-wire grounding type and rated 20 amperes, 125 volts, and two of the three connected to two separate branch circuits.

Informational Note: For the nonlocking-type and grounding-type 20-ampere receptacle configuration, see ANSI/NEMA WD6-

~~2012~~

201 **6** , *Wiring Devices — Dimensional Specifications* , Figure 5-20.

(2) One single receptacle, 3-pole, 4-wire grounding type, single phase rated either 30 amperes 208Y/120 volts or 125/250 volts. The 125/250-volt receptacle shall be permitted to be used on a 208Y/120-volt, single-phase circuit.

Informational Note: For various configurations of 30-ampere pin and sleeve receptacles, see ANSI/UL1686, *Standard for Pin and Sleeve Configurations* , Figure C2.9 or Part C3.

Exception: Where electrified truck parking space supply equipment provides the heating, air-conditioning, and comfort-cooling function without requiring a direct electrical connection at the truck, only two receptacles identified in 626.24(B)(1) shall be required.

Statement of Problem and Substantiation for Public Input

Referenced current edition of ANSI/NEMA WD6.

Submitter Information Verification

Submitter Full Name: Aaron Adamczyk
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Street Address:
City:
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Submittal Date: Sun May 14 22:52:59 EDT 2017

Public Input No. 726-NFPA 70-2017 [Section No. 626.25(B)(4)]

(4) Attachment Plug.

The attachment plug(s) shall be listed, by itself or as part of a cord set, for the purpose and shall be molded to or installed on the flexible cord so that it is secured tightly to the cord at the point where the cord enters the attachment plug. If a right-angle cap is used, the configuration shall be oriented so that the grounding member is farthest from the cord. Where a flexible cord is provided, the attachment plug shall comply with 250.138(A).

(a) *Connection to a 20-Ampere Receptacle.* A separable power-supply cable assembly for connection to a truck flanged surface inlet, rated at 20 amperes, shall have a nonlocking-type attachment plug that shall be 2-pole, 3-wire grounding type rated 20 amperes, 125 volts and intended for use with the 20-~~?~~ ampere, 125-volt receptacle.

Exception: A separable power-supply cable assembly, rated 15 amperes, provided for the connection of an engine block heater, only, shall have an attachment plug that shall be 2-pole, 3-wire grounding type rated 15 amperes, 125 volts.

Informational Note: For nonlocking- and grounding-type 15- or 20-ampere plug and receptacle configurations, see ANSI/NEMA WD6-

~~2002, *Standard for Dimensions of Attachment Plugs and Receptacles*~~

2016 , ***Wiring Devices- Dimensional Specifications*** , Figure 5-15 or Figure 5-20.

(b) *Connection to a 30-Ampere Receptacle.* A separable power-supply cable assembly for connection to a truck flanged surface inlet, rated at 30 amperes, shall have an attachment plug that shall be 3-pole, 4-wire grounding type rated 30-?amperes, 208Y/120 volts or 125/250 volts, and intended for use with the receptacle in accordance with 626.24(B)(2). The 125/250-volt attachment plug shall be permitted to be used on a 208Y/120-volt, single-phase circuit.

Informational Note: For various configurations of 30-ampere pin and sleeve plugs, see ANSI/UL 1686-2012, *Standard for Pin and Sleeve Configurations* , Figure C2.10 or Part C3.

Statement of Problem and Substantiation for Public Input

Referenced current edition of ANSI/NEMA WD 6.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 725-NFPA 70-2017 [Section No. 626.24(B)]	Referenced current edition of ANSI/NEMA WD 6.

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Submittal Date: Sun May 14 22:58:43 EDT 2017

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I, Aaron Adamczyk, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am Aaron Adamczyk, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Input No. 3765-NFPA 70-2017 [Section No. 626.30(A)]

(A) Branch Circuits.

TRU spaces shall be supplied from 208-volt, 3-phase or 240-volt, 3-phase or 480-volt, 3-phase branch circuits and with an equipment grounding conductor.

Exception: Private facilities shall be permitted to supply TRU spaces with other supply systems based site availability.

Statement of Problem and Substantiation for Public Input

Transport refrigeration units are commonly available that require a 240 volt, 3 phase supply which is currently not permitted for these installations by the existing requirements in this section. An exception which permits other voltage systems for private installations is also needed to support other system voltages such as permitted in 626.31(C)(3) and 626.32(A)(3).

Submitter Information Verification

Submitter Full Name: Chad Kennedy

Organization: Schneider Electric

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Submittal Date: Wed Sep 06 20:53:37 EDT 2017

Public Input No. 3767-NFPA 70-2017 [Section No. 626.31(C)]

(C) Receptacles.

All receptacles shall be listed and of the grounding type. Every electrified truck parking space intended to provide an electrical supply for transport refrigerated units shall be equipped with one or more of the following:

(1) A 30-ampere, 480-volt, 3-phase, 3-pole, 4-wire receptacle

(2) A 60-ampere, 208-volt, 3-phase, 3-pole, 4-wire receptacle

(3) A 20-ampere, 1000-volt, 3-phase, 3-pole, 4-wire receptacle, pin and sleeve type

(4) A 60-ampere, 250-volt, 3-phase, 3-pole, 4-wire receptacle

(5) A 60-ampere, 480-volt, 3-phase, 3-pole, 4-wire receptacle

Informational Note: Complete details of the 30-ampere pin and sleeve receptacle configuration for refrigerated containers (transport refrigerated units) can be found in ANSI/UL 1686-2012, *Standard for Pin and Sleeve Configurations*, Figure C2.11. For various configurations of 60-ampere pin and sleeve receptacles, see ANSI/UL1686.

Statement of Problem and Substantiation for Public Input

Transport refrigeration units are commonly available that require a 250 volt, 3 phase, 60 ampere or a 480 volt, 3 phase, 60 ampere receptacle which is currently not permitted for these installations by the existing requirements in this section.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3765-NFPA 70-2017 [Section No. 626.30(A)]	

Submitter Information Verification

Submitter Full Name: Chad Kennedy

Organization: Schneider Electric

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Submittal Date: Wed Sep 06 20:58:12 EDT 2017

Public Input No. 3769-NFPA 70-2017 [Section No. 626.32(A)]

(A) Rating(s).

The power supply cable assembly shall be listed and be rated in accordance with one of the following:

(1) 30 ampere, 480-volt, 3-phase

(2) 60 ampere, 208-volt, 3-phase

(3) ~~A~~ 20-ampere, 1000-volt, 3-phase

(4) 60-ampere, 480-volt, 3-phase

(5) 60-ampere, 250-volt, 3-phase

Statement of Problem and Substantiation for Public Input

Transport refrigeration units are commonly available that require a 250 volt, 3 phase, 60 ampere or a 480 volt, 3 phase, 60 ampere cable assemblies which are currently not permitted for these installations by the existing requirements in this section.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3765-NFPA 70-2017 [Section No. 626.30(A)]	

Submitter Information Verification

Submitter Full Name: Chad Kennedy

Organization: Schneider Electric

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Submittal Date: Wed Sep 06 21:02:38 EDT 2017

Public Input No. 3775-NFPA 70-2017 [Section No. 626.32(C)]

(C) Attachment Plug(s) and Cord Connector(s).

Where a flexible cord is provided with an attachment plug and cord connector, they shall comply with 250.138(A). The attachment plug(s) and cord connector(s) shall be listed, by itself or as part of the power-supply cable assembly, for the purpose and shall be molded to or installed on the flexible cord so that it is secured tightly to the cord at the point where the cord enters the attachment plug or cord connector. If a right-angle cap is used, the configuration shall be oriented so that the grounding member is farthest from the cord. An attachment plug and cord connector for the connection of a truck or trailer shall be rated in accordance with one of the following:

(1) 30-ampere, 480-volt, 3-phase, 3-pole, 4-wire and intended for use with a 30-ampere 480-volt, 3-phase, 3-pole, 4-wire receptacles and inlets, respectively

(2) 60-ampere, 208-volt, 3-phase, 3-pole, 4-wire and intended for use with a 60-ampere, 208-volt, 3-phase, 3-pole, 4-wire receptacles and inlets, respectively, or

(3) 20-ampere, 1000-volt, 3-phase, 3-pole, 4-wire and intended for use with a 20-ampere, 1000-volt, 3-phase, 3-pole, 4-wire receptacles and inlets, respectively.

(4) 60-ampere, 480-volt, 3-phase, 3-pole, 4-wire and intended for use with a 60-ampere, 480-volt, 3-phase, 3-pole, 4-wire receptacles and inlets, respectively

(5) 60-ampere, 250-volt, 3-phase, 3-pole, 4-wire and intended for use with a 60-ampere, 250-volt, 3-phase, 3-pole, 4-wire receptacles and inlets, respectively

Informational Note: Complete details of the 30-ampere pin and sleeve attachment plug and cord connector configurations for refrigerated containers (transport refrigerated units) can be found in ANSI/UL 1686-2012, *Standard for Pin and Sleeve Configurations*, Figures C2.12 and C2.11. For various configurations of 60-ampere pin and sleeve attachment plugs and cord connectors, see ANSI/UL1686.

Statement of Problem and Substantiation for Public Input

Transport refrigeration units are commonly available that require a 250 volt, 3 phase, 60 ampere or a 480 volt, 3 phase, 60 ampere plug and cord connectors which are currently not permitted for these installations by the existing requirements in this section.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3765-NFPA 70-2017 [Section No. 626.30(A)]	

Submitter Information Verification

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Submittal Date: Wed Sep 06 21:09:24 EDT 2017

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Public Input No. 923-NFPA 70-2017 [Section No. 630.31(A)]

(A) Individual Welders.

The ~~rated~~ ampacity ~~for~~ of conductors for individual welders shall comply with the following:

(1) The ampacity of the supply conductors for a welder that may be operated at different times at different values of primary current or duty cycle shall not be less than 70 percent of the rated primary current for seam and automatically fed welders, and 50 percent of the rated primary current for manually operated nonautomatic welders.

(2) The ampacity of the supply conductors for a welder wired for a specific operation for which the actual primary current and duty cycle are known and remain unchanged shall not be less than the product of the actual primary current and the multiplier specified in Table 630.31(A)?(2) for the duty cycle at which the welder will be operated.

Table 630.31(A)(2) Duty Cycle Multiplication Factors for Resistance Welders

Duty Cycle (%)	Multiplier
50	0.71
40	0.63
30	0.55
25	0.50
20	0.45
15	0.39
10	0.32
7.5	0.27
5 or less	0.22

Statement of Problem and Substantiation for Public Input

This public input is the work of an Ampacity Task Group. The task group consisted of the following members: Thomas Domitrovich, Dave Mercier, Christine Porter, Derrick Atkins, and Christel Hunter.

The Task Group identified the use of the word rated to describe ampacity is not appropriate when addressing the ampacity of a conductor. The use of the term "rating" generally applies to equipment where as ampacity applies to conductors.

Ampacity of a conductor is defined as part of Article 100 as "The maximum current, in amperes, that a conductor can carry continuously under the conditions of use without exceeding its temperature rating." Tables 310.15(B)(16) through (21) establish the ampacity of conductors under specified conditions of use.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 919-NFPA 70-2017 [Definition: Overload.]	Removal of the term "rated" as it pertains to ampacity
Public Input No. 920-NFPA 70-2017 [Section No. 450.6(A)(1)]	Removal of the term "rated" as it pertains to ampacity

Public Input No. 921-NFPA 70-2017 [Section No. 450.6(A)(2)]	Removal of the term "rated" as it pertains to ampacity
Public Input No. 922-NFPA 70-2017 [Section No. 530.18(E)]	Removal of the term "rated" as it pertains to ampacity
Public Input No. 949-NFPA 70-2017 [Section No. 230.23]	Removal of the term "rated" as it pertains to ampacity
Public Input No. 950-NFPA 70-2017 [Section No. 310.15(B)(7)]	Removal of the term "rated" as it pertains to ampacity
Public Input No. 924-NFPA 70-2017 [Section No. 660.6(B)]	Removal of the term "rated" as it pertains to ampacity
Public Input No. 2140-NFPA 70-2017 [Section No. 210.19(A) [Excluding any Sub-Sections]]	Removal of the term "rated" as it pertains to ampacity
Public Input No. 2144-NFPA 70-2017 [Section No. 725.144(A)]	Removal of the term "rated" as it pertains to ampacity

Submitter Information Verification

Submitter Full Name: Thomas Domitrovich

Organization: Eaton Corporation

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Submittal Date: Wed Jun 07 19:09:54 EDT 2017

Public Input No. 670-NFPA 70-2017 [New Section after 630.34]

630.35 Ground-Fault Circuit-Interrupter Protection for Personnel in welding shops.

All 125-volt, single-phase, 15- and 20-ampere receptacles installed in work areas where welders are operated, for electrical hand tools or portable lighting equipment, shall have ground-fault circuit-interrupter protection for personnel.

Statement of Problem and Substantiation for Public Input

I cringe every time I inspect a new high school that contains a welding shop. These welding shop areas are very common to new high schools. Although I can usually get the contractor to install GFCI protection for the 15- and 20-ampere welding shop receptacles, there is really nothing in the National Electrical Code to require this.

It is now the norm that National Electrical Code provide GFCI protection for people that work with hand tools. For instance, Article 511.12 requires that all 125-volt, single-phase, 15- and 20-ampere receptacles installed in areas where electrical diagnostic equipment, electrical hand tools, or portable lighting equipment are to be used shall have ground-fault circuit-interrupter protection for personnel. Welding shops usually contain work benches where electrical hand tools or portable lighting equipment is frequently used. Don't our kids deserve the same level of protection? The floors in these areas are usually concrete (a grounded surface) and as you know NEC considers concrete, brick, or tile to be a grounded surface. I feel that the GFCI protection is needed.

Accepting this change would also create consistency with other sections of the code. I also submit alternate language (the short version): "All 125-volt, single-phase, 15- and 20-ampere receptacles installed in work areas where welders are operated shall have ground-fault circuit-interrupter protection for personnel."

Submitter Information Verification

Submitter Full Name: Nick Sasso

Organization: State of Wyoming

Street Address:

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Zip:

Submittal Date: Sun May 07 16:56:17 EDT 2017

Public Input No. 1915-NFPA 70-2017 [Section No. 640.2]

640.2 Definitions. The definitions in this section shall apply only within this article.

For purposes of this article, the following definitions apply.

Abandoned Audio Distribution Cable.

Installed audio distribution cable that is not terminated at equipment and not identified for future use with a tag.

Audio Amplifier or Pre-Amplifier.

Electronic equipment that increases the current or voltage, or both, of an audio signal intended for use by another piece of audio equipment. *Amplifier* is the term used within this article to denote an audio amplifier.

Audio Autotransformer.

A transformer with a single winding and multiple taps intended for use with an amplifier loudspeaker signal output.

Audio Signal Processing Equipment.

Electrically operated equipment that produces, processes, or both, electronic signals that, when appropriately amplified and reproduced by a loudspeaker, produce an acoustic signal within the range of normal human hearing (typically 20–20 kHz). Within this article, the terms *equipment* and *audio equipment* are assumed to be equivalent to audio signal processing equipment.

Informational Note: This equipment includes, but is not limited to, loudspeakers; headphones; pre-amplifiers; microphones and their power supplies; mixers; MIDI (musical instrument digital interface) equipment or other digital control systems; equalizers, compressors, and other audio signal processing equipment; and audio media recording and playback equipment, including turntables, tape decks and disk players (audio and multimedia), synthesizers, tone generators, and electronic organs. Electronic organs and synthesizers may have integral or separate amplification and loudspeakers. With the exception of amplifier outputs, virtually all such equipment is used to process signals (utilizing analog or digital techniques) that have nonhazardous levels of voltage or current.

Audio System.

Within this article, the totality of all equipment and interconnecting wiring used to fabricate a fully functional audio signal processing, amplification, and reproduction system.

Audio Transformer.

A transformer with two or more electrically isolated windings and multiple taps intended for use with an amplifier loudspeaker signal output.

Equipment Rack.

A framework for the support, enclosure, or both, of equipment; can be portable or stationary.

Informational Note: See EIA/ECIA 310-E-2005, *Cabinets, Racks, Panels and Associated Equipment*.

Loudspeaker.

Equipment that converts an ac electric signal into an acoustic signal. The term *speaker* is commonly used to mean *loudspeaker*.

Maximum Output Power.

The maximum power delivered by an amplifier into its rated load as determined under specified test conditions.

Informational Note: The maximum output power can exceed the manufacturer's rated output power for the same amplifier.

Mixer.

Equipment used to combine and level match a multiplicity of electronic signals, such as from microphones, electronic instruments, and recorded audio.

Portable Equipment.

Equipment fed with portable cords or cables intended to be moved from one place to another.

Rated Output Power.

The amplifier manufacturer's stated or marked output power capability into its rated load.

Technical Power System.

An electrical distribution system with grounding in accordance with 250.146(D), where the equipment grounding conductor is isolated from the premises grounded conductor and the premises equipment grounding conductor except at a single grounded termination point within a branch-circuit panelboard, at the originating (main breaker) branch-circuit panelboard, or at the premises grounding electrode.

Temporary Equipment.

Portable wiring and equipment intended for use with events of a transient or temporary nature where all equipment is presumed to be removed at the conclusion of the event.

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of task group appointed by the NEC Correlating Committee. This task group was appointed to identify potential issues in the NEC with respect to how definitions in both Article 100 and the XXX.2 sections of this Code apply. The member of the task group are: David Hittinger, Rich Holub, Chris Hunter, Dave Williams, Chris Porter, Alan Manche, Ken Boyce, John Kovacik, Donny Cook, Dave Kendall and Jim Dollard.

Section 2.2.2.1 of the NEC Style Manual requires that in general definitions that appear in two or more articles be located in Article 100. Section 2.2.2.2 requires that where an individual article contains definition(s), they be located in the second section (XXX.2) of the article. It is extremely important to note that the style manual does not prohibit a definition in the second section of an article from applying elsewhere in the NEC. The style manual clearly states that in general definitions that appear in two or more articles shall be located in Article 100. This has confused many code users in the past. This style manual requirement is accurate and these public inputs are simply an attempt to provide needed clarity. See the example below:

344.2 Definition.
Rigid Metal Conduit (RMC). A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.

The definition of the term "rigid metal conduit" is appropriately located in the article that contains general, installation and construction specifications for this raceway. It is commonly understood that the term "rigid metal conduit" is used in more than one article. There are many articles that contain a single definition that is necessary for application of the contained requirements but will apply elsewhere in the NEC. This occurs in articles that address cable assemblies, raceways, systems and more.
This public input seeks to delete the last sentence in the first paragraph, as it is unnecessary. A new sentence is proposed to simply inform the user of the code that definitions are also found in the second section (XXX.2) of other articles.
This public input is supplemented with proposed revisions to the second section (XXX.2) of articles that contain definitions. New parent text is proposed for these sections to increase clarity and usability. There are two different scenarios that will be addressed. First, any second section (XXX.2) that contains definitions that apply only within that article will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply only within this article.

Second, any second section (XXX.2) that contains definitions that apply within the individual article and throughout the code will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply within this article and throughout the code.

In a few cases, in the second section (XXX.2) of an Article there are definitions that will apply only in that Article and some that will apply in that Article and throughout the code. New parent text and first level subdivisions are proposed to achieve clarity and usability The combination of these proposed revisions will provide necessary clarity and usability with respect to application of definitions. These actions will also achieve compliance with the NEC Style Manual.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1202-NFPA 70-2017 [Article 100 [Excluding any Sub-Sections]]	

Submitter Information Verification

Submitter Full Name: James Dollard

Organization: IBEW Local Union 98

Street Address:

City:

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Submittal Date: Tue Aug 08 13:17:32 EDT 2017

Public Input No. 727-NFPA 70-2017 [Definition: Equipment Rack.]

Equipment Rack.

A framework for the support, enclosure, or both, of equipment; can be portable or stationary.

Informational Note: See **EIA/** ~~ECIA 310~~ **ECA 310E** ~~-E-~~ 2005,*Cabinets, Racks, Panels and Associated Equipment*.

Statement of Problem and Substantiation for Public Input

Referenced current SDO for referenced national consensus standard.

Submitter Information Verification

Submitter Full Name: Aaron Adamczyk
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Sun May 14 23:32:59 EDT 2017

Public Input No. 2040-NFPA 70-2017 [Definition: Technical Power System.]

Technical Power System.

An electrical distribution system ~~with grounding in accordance with 250.146(D) ,~~ where the equipment grounding conductor is isolated from the premises grounded conductor and the premises equipment grounding conductor except at a single grounded termination point within a branch-circuit panelboard, at the originating (main breaker) branch-circuit panelboard, or at the premises grounding electrode.

Statement of Problem and Substantiation for Public Input

Removed text that only make the definition confusing.

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc

Street Address:

City:

State:

Zip:

Submittal Date: Wed Aug 09 16:02:51 EDT 2017

Public Input No. 2882-NFPA 70-2017 [Section No. 640.5]

~~**640.5** Access to Electrical Equipment Behind Panels Designed to Allow Access.~~

~~Access to equipment shall not be denied by an accumulation of wires and cables that prevents removal of panels, including suspended ceiling panels.~~

Statement of Problem and Substantiation for Public Input

This section is redundant to section 300.23, which deals with the accumulation of cables and conductors. This section should be deleted.

Other similar proposals have been submitted by a Correlating Committee Task Group that is reviewing the usability and clarity of Articles throughout Chapter 7 and Chapter 8. While this is not a part of this Task Group's work this public input seeks to delete redundant text that is already covered by 300.23.

Submitter Information Verification

Submitter Full Name:	David Hittinger
Organization:	Independent Electrical Contractor
Affilliation:	IEC
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Mon Aug 28 16:06:52 EDT 2017

Public Input No. 2911-NFPA 70-2017 [Section No. 640.6]

~~**640.6** Mechanical Execution of Work.~~

~~**(A)** Installation of Audio Distribution Cables.~~

~~Cables installed exposed on the surface of ceilings and sidewalls shall be supported in such a manner that the audio distribution cables will not be damaged by normal building use. Such cables shall be secured by straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall conform to 300.4 and 300.11(A) .~~

~~**(B)** Abandoned Audio Distribution Cables.~~

~~The accessible portion of abandoned audio distribution cables shall be removed.~~

~~**(C)** Installed Audio Distribution Cable Identified for Future Use.~~

~~**(1)**~~

~~Cables identified for future use shall be marked with a tag of sufficient durability to withstand the environment involved.~~

~~**(2)**~~

~~Cable tags shall have the following information:~~

(1) ~~Date cable was identified for future use~~

(2) ~~Date of intended use~~

(3) ~~Information related to the intended future use of cable~~

Statement of Problem and Substantiation for Public Input

Requirements for mechanical execution of work, access to electrical equipment, and abandoned cables are repeated in numerous places throughout the code, mainly in Chapter 7 and Chapter 8.

The main requirement or driving text for mechanical execution of work is in 110.12 and access to electrical equipment is covered in 300.23. The main driver for abandoned cables is spread throughout Chapter 7 and Chapter 8. Public inputs are being submitted by a Correlating Committee Task Group to try and relocate all main drivers for these requirements into article 110 and 300, allowing the redundant text in Chapter 7 and Chapter 8 to be deleted. This will improve usability and clarity.

These public inputs will make changes to mechanical execution of work in a new 110.12(C), Access to Electrical Equipment Behind Panels in a revised 300.23, and an alternate location of Mechanical Execution of Work in a new 300.24.

While this specific public input is not a part of the task groups work, it is being submitted to propose deletion of similar redundant requirements in Article 640 since these requirements are found elsewhere in the code.

Submitter Information Verification

Submitter Full Name: David Hittinger

Organization: Independent Electrical Contractor

Affilliation: IEC

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Zip:

Submittal Date: Tue Aug 29 09:40:33 EDT 2017

Copyright Assignment

Public Input No. 728-NFPA 70-2017 [Section No. 640.9(C)]

(C) Output Wiring and Listing of Amplifiers.

Amplifiers with output circuits carrying audio program signals shall be permitted to employ Class 1, Class 2, or Class 3 wiring where the amplifier is listed and marked for use with the specific class of wiring method. Such listing shall ensure the energy output is equivalent to the shock and fire risk of the same class as stated in Article 725. Overcurrent protection shall be provided and shall be permitted to be inherent in the amplifier.

Audio amplifier output circuits wired using Class 1 wiring methods shall be considered equivalent to Class 1 circuits and shall be installed in accordance with 725.46, where applicable.

Audio amplifier output circuits wired using Class 2 or Class 3 wiring methods shall be considered equivalent to Class 2 or Class 3 circuits, respectively. They shall use conductors insulated at not less than the requirements of 725.179 and shall be installed in accordance with 725.133 and 725.154.

Informational Note No. 1: ANSI/UL 1711-2006, *Amplifiers for Fire Protective Signaling Systems*, contains requirements for the listing of amplifiers used for fire alarm systems in compliance with *NFPA 72*-2013, *National Fire Alarm and Signaling Code*.

Informational Note No. 2: Examples of requirements for listing amplifiers used in residential, commercial, and professional use are found in ANSI/UL 813-1996, *Commercial Audio Equipment*; ANSI/UL 1419-~~2011~~ 201 **6** , *Professional Video and Audio Equipment*; ANSI/UL 1492-2010, *Audio-Video Products and Accessories*; ANSI/UL 6500-~~2006~~ 20 **15** , *Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar Use*; and UL 62368-1-~~2012~~ 201 **4** , *Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements*.

Statement of Problem and Substantiation for Public Input

Referenced current edition of national consensus standards.

Submitter Information Verification

Submitter Full Name: Aaron Adamczyk

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Submittal Date: Sun May 14 23:38:20 EDT 2017

Public Input No. 1916-NFPA 70-2017 [Section No. 645.2]

645.2 Definitions. The definitions in this section shall apply only within this article.

Abandoned Supply Circuits and Interconnecting Cables.

Installed supply circuits and interconnecting cables that are not terminated at equipment and not identified for future use with a tag.

Critical Operations Data System.

An information technology equipment system that requires continuous operation for reasons of public safety, emergency management, national security, or business continuity.

Information Technology Equipment Room.

A room within the information technology equipment area that contains the information technology equipment. [**75:**3.3.9]

Remote Disconnect Control.

An electric device and circuit that controls a disconnecting means through a relay or equivalent device.

Zone.

A physically identifiable area (such as barriers or separation by distance) within an information technology equipment room, with dedicated power and cooling systems for the information technology equipment or systems.

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of task group appointed by the NEC Correlating Committee. This task group was appointed to identify potential issues in the NEC with respect to how definitions in both Article 100 and the XXX.2 sections of this Code apply. The member of the task group are: David Hittinger, Rich Holub, Chris Hunter, Dave Williams, Chris Porter, Alan Manche, Ken Boyce, John Kovacik, Donny Cook, Dave Kendall and Jim Dollard.

Section 2.2.2.1 of the NEC Style Manual requires that in general definitions that appear in two or more articles be located in Article 100. Section 2.2.2.2 requires that where an individual article contains definition(s), they be located in the second section (XXX.2) of the article. It is extremely important to note that the style manual does not prohibit a definition in the second section of an article from applying elsewhere in the NEC. The style manual clearly states that in general definitions that appear in two or more articles shall be located in Article 100. This has confused many code users in the past. This style manual requirement is accurate and these public inputs are simply an attempt to provide needed clarity. See the example below:

344.2 Definition.
Rigid Metal Conduit (RMC). A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.

The definition of the term “rigid metal conduit” is appropriately located in the article that contains general, installation and construction specifications for this raceway. It is commonly understood that the term “rigid metal conduit” is used in more than one article. There are many articles that contain a single definition that is necessary for application of the contained requirements but will apply elsewhere in the NEC. This occurs in articles that address cable assemblies, raceways, systems and more.
This public input seeks to delete the last sentence in the first paragraph, as it is unnecessary. A new sentence is proposed to simply inform the user of the code that definitions are also found in the second section (XXX.2) of other articles.
This public input is supplemented with proposed revisions to the second section (XXX.2) of articles that contain definitions. New parent text is proposed for these sections to increase clarity and usability. There are two different scenarios that will be addressed. First, any second section (XXX.2) that contains definitions that apply only within that article will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply only within this article.

Second, any second section (XXX.2) that contains definitions that apply within the individual article and throughout the code will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply within this article and throughout the code.

In a few cases, in the second section (XXX.2) of an Article there are definitions that will apply only in that Article and some that will apply in that Article and throughout the code. New parent text and first level subdivisions are proposed to achieve clarity and usability The combination of these proposed revisions will provide necessary clarity and usability with respect to application of definitions. These actions will also achieve compliance with the NEC Style Manual.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1202-NFPA 70-2017 [Article 100 [Excluding any Sub-Sections]]	

Submitter Information Verification

Submitter Full Name: James Dollard
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Submittal Date: Tue Aug 08 13:50:39 EDT 2017

Public Input No. 1865-NFPA 70-2017 [Section No. 645.3(D)]

(D) Electrical Classification of Data Circuits.

Section 725.121(A)(4) shall apply to the electrical classification of listed information technology equipment signaling circuits. Sections 725.139(D)(1) and 800.133(A)(1)(c) shall apply to the electrical classification of Class 2 and Class 3 circuits in the same cable with communications circuits.

Informational Note: See ANSI/TIA-568.0-D-2015, *Generic Telecommunications Cabling for Customer Premises* , ANSI/TIA 568.3-D-2016, *Optical Fiber Cabling and Components Standard* and ANSI/TIA-C.2-2009, and *Balanced Twisted-Pair Telecommunications Cabling and Components Standard* for industry practices on cabling used for data circuits with information technology equipment

Statement of Problem and Substantiation for Public Input

The article does not identify the type of cabling that is used. This informational note referring to ANSI/TIA standards clarifies what type of cabling article 645.3(D) is using for its network.

Submitter Information Verification

Submitter Full Name:	Masood Shariff
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State:	
Zip:	
Submittal Date:	Mon Aug 07 15:50:39 EDT 2017

Public Input No. 4024-NFPA 70-2017 [Section No. 645.4]

645.4 Special Requirements for Information Technology Equipment Room.

The alternative wiring methods to Chapter 3 and Parts I and III of Article 725 for signaling wiring and Parts I and V of Article 770for optical fiber cabling shall be permitted where all of the following conditions are met:

(1) Disconnecting means complying with 645.10 are provided.

(2) A heating/ventilating/air-conditioning (HVAC) system is provided in one of the methods identified in 645.4(2) a or b.

(3) A separate HVAC system that is dedicated for information technology equipment use and is separated from other areas of occupancy; or

(4) An HVAC system that serves other occupancies and meets all of the following:

(5) Also serves the information technology equipment room

(6) Provides fire/smoke dampers at the point of penetration of the room boundary

(7) Activates the damper operation upon initiation by smoke detector alarms, by operation of the disconnecting means required by 645.10, or by both

Informational Note: For further information, see NFPA 75-2017, *Standard for the Fire Protection of Information Technology Equipment*, Chapter 10, 10.1, 10.1.1, 10.1.2, and 10.1.3.

(8) All information technology and communications equipment installed in the room is listed.

(9) The room is occupied by, and accessible to, only those personnel needed for the maintenance and functional operation of the installed information technology equipment.

(10) The room is separated from other occupancies by fire-resistant-rated walls, floors, and ceilings with protected openings.

Informational Note: For further information on room construction requirements, see NFPA 75-2017, *Standard for the Fire Protection of Information Technology Equipment*, Chapter 5.

(11) Only electrical equipment and wiring associated with the operation of the information technology room is installed in the room.

Informational Note No. 1: HVAC systems, communications systems, and monitoring systems such as telephone, fire alarm systems, security systems, water detection systems, and other related protective equipment are examples of equipment associated with the operation of the information technology room.

Informational Note No. 2: The less restrictive installation of wiring methods permitted under the floor in an Information Technology Room is predicated on limited personnel entering the IT Room. Personnel entering an IT Room are restricted to those wo maintain or service the installation, and ensure proper function.

Statement of Problem and Substantiation for Public Input

The objective of Article 645 is often misunderstood, and the requirements are misapplied.
It is not Code-compliant for clerical and administrative staff to be quartered in the same room as the IT Equipment
An IT Room is not simply 'a computer room', where a number of personnel and computers work daily. It is not intended to be a continuously occupied space.
Rather, an IT Room is restricted to personnel who maintain or service the equipment, or assure its proper functioning, and that is the reason that cables are permitted to be installed laying on the floor, with an HVAC unit blowing cooling air

under the floor space to better keep Listed cables and Listed Information Technology Equipment cool under load. It is also the reason why special requirements for disconnecting means exist for all power to IT and HVAC Equipment in or serving the room. When maintenance or service, etc., is completed, personnel leave the room and secure the door. This simple informational note will call attention to designers, installers, IT personnel, and enforcement personnel as to the true intent of these type of spaces.

.

Submitter Information Verification

Submitter Full Name: Michael Weitzel

Organization:

Street Address:

City:

State:

Zip:

Submittal Date: Thu Sep 07 12:30:00 EDT 2017

Public Input No. 1957-NFPA 70-2017 [Section No. 645.5(A)]

(A) Branch-Circuit Conductors.

~~The branch~~ Information technology equipment shall be considered a continuous load. Branch - circuit conductors ~~supplying one or more units of information technology equipment shall have an ampacity not less than 125 percent of the total connected load.~~ shall be sized in accordance with 210.19(A) and have ov ercurrent protection in accordance with 210.20.

Statement of Problem and Substantiation for Public Input

Revised text to help the user apply the requirements properly.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
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Submittal Date: Wed Aug 09 12:00:39 EDT 2017

Public Input No. 175-NFPA 70-2017 [Section No. 645.5(E) [Excluding any Sub-Sections]]

Where the area under the floor is accessible and openings minimize the entrance of debris beneath the floor, power cables, ~~communication~~ communications cables, connecting cables, interconnecting cables, cord-and-plug connections, and receptacles associated with the information technology equipment shall be permitted under a raised floor of approved construction. The installation requirement shall comply with 645.5(E)(1) through (3).

Statement of Problem and Substantiation for Public Input

This PI is editorial. “Communication” should be plural, “communications”.

Submitter Information Verification

Submitter Full Name: Stanley Kaufman

Organization: Cablesafe Incofs

Affilliation: PLASTICS Industry Association, formerly SPI

Street Address:

City:

State:

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Submittal Date: Sun Feb 05 05:27:26 EST 2017

Public Input No. 2103-NFPA 70-2017 [Section No. 645.5(E)(1)]

(1) Installation Requirements for Branch Circuit Supply Conductors Under a Raised Floor.

(a) ~~The supply conductors shall be installed in accordance with the requirements of 300.11 .~~

(b) ~~In addition to the wiring methods of 300.22(C) , the following wiring methods shall also be permitted:~~

(3) ~~Rigid metal conduit~~

(4) ~~Rigid nonmetallic conduit~~

(5) ~~Intermediate metal conduit~~

(6) ~~Electrical metallic tubing~~

(7) ~~Electrical nonmetallic tubing~~

(8) ~~Metal wireway~~

(9) ~~Nonmetallic wireway~~

(10) ~~Surface metal raceway with metal cover~~

(11) ~~Surface nonmetallic raceway~~

(12) ~~Flexible metal conduit~~

(13) ~~Liquidtight flexible metal conduit~~

(14) ~~Liquidtight flexible nonmetallic conduit~~

(15) ~~Type MI cable~~

(16) ~~Type MC cable~~

(17) ~~Type AC cable~~

(18) ~~Associated metallic and nonmetallic boxes or enclosures~~

(19) ~~Type TC power and control tray cable~~

(a) Raceways, cable assemblies, boxes, cabinets, and fittings shall be securely fastened in place.

(b) Any wiring method shall be permitted under a raised floor

Statement of Problem and Substantiation for Public Input

Remove reference to 300.11 for securing, and delete the 'list' of wiring methods so that this rule can be easier applied.

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc

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City:

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Submittal Date: Thu Aug 10 13:26:57 EDT 2017

Copyright Assignment

Public Input No. 3244-NFPA 70-2017 [Section No. 645.5(E)(2)]

(2) Installation Requirements for Electrical Supply Cords, Data Cables, Interconnecting Cables, and Grounding Conductors Under a Raised Floor.

The following cords, cables, and conductors shall be permitted to be installed under a raised floor:

(1) Supply cords of listed information technology equipment in accordance with 645.5(B)

(2) Interconnecting cables enclosed in a raceway

(3) Equipment grounding conductors

~~In addition to wiring~~

(4) Where the air space below a raised floor is not protected by an automatic fire suppression system , wiring under the raised floor shall be installed in compliance with 725.135(C) , including Type CMP substituting for Types CL2P and CL3P.

(5) Where the air space below a raised floor is protected by an automatic fire suppression system, wiring installed in compliance with 725.135(C) shall be permitted under the raised floor and Types CL2R, CL3R, CL2, and CL3 and substitute cables including CMP, CMR, CM, and CMG installed in accordance with 725.154(A), shall also be permitted ~~under raised floors~~ .

Informational Note: Figure 725.154(A) illustrates the cable substitution hierarchy for Class 2 and Class 3 cables.

(6) Listed Type DP cable having adequate fire-resistant characteristics suitable for use under raised floors of an information technology equipment room

Informational Note: One method of defining *fire resistance* is by establishing that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2011, *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables* . The smoke measurements in the test method are not applicable.

Another method of defining *fire resistance* is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-09, *Test Methods for Electrical Wires and Cables* .

Additional Proposed Changes

File Name	Description	Approved
PC_32.pdf	70_PC32	✓

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as "Reject but Hold" in Public Comment No. 32 of the (A2016) Second Draft Report for NFPA 70 and per the Regs. at 4.4.8.3.1.

Substantiation: The development schedule of the 2016 edition of NFPA 75, Standard for the Fire Protection of Information Technology Equipment is about 6 months ahead of the development schedule for NFPA 70. There are pending changes to the wiring requirements in NFPA 75 that will require correlating changes in Article 645.

The text of section 11.3.7 and the explanatory Annex Note A.11.3.7 in NFPA 75-2016 will be:

11.3.7* Signal wiring and cabling, including optical fiber cables, installed in an air space below a raised floor shall be listed.

11.3.7.1 Where the air space below a raised floor is protected by an automatic fire suppression system, signal wiring and cabling listed for plenum, riser and general-purpose use shall be permitted to be installed exposed to the airflow in an air space below a raised floor.

11.3.7.2 Where the air space below a raised floor is not protected by an automatic fire suppression system, only signal wiring and cabling listed for plenum use shall be permitted to be installed exposed to the airflow in an air space below a raised floor.

11.3.7.3 Where the air space below a raised floor is not protected by an automatic fire suppression system, signal wiring and cabling listed for plenum, riser and general-purpose use shall be permitted to be installed in metal raceway in an air space below a raised floor.

A11.3.7* See 9.1.1.3. The installation of general-purpose and riser cables exposed to the airflow in the air space below a raised floor is permitted only where the space is protected by an automatic fire suppression system.

Section 645.5(E) needs to be revised to permit the use on riser and general-purpose cables (Types CL2R, CL3R, OFNR, OFCR, CL2, CL3, OFN and OFC) only where the under floor space has automatic fire suppression in place.

Submitter Information Verification

Submitter Full Name: CMP ON NEC-P12

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Submittal Date: Mon Sep 04 16:02:40 EDT 2017

Public Comment No. 32-NFPA 70-2015 [Section No. 645.5(E)(2)]

(2) Installation Requirements for Electrical Supply Cords, Data Cables, Interconnecting Cables and Grounding Conductors Under a Raised Floor.

The following cords, cables and conductors shall be permitted to be installed under a raised floor:

(1) Supply cords of listed information technology equipment in accordance with 645.5(B)

(2) Interconnecting cables enclosed in a raceway

(3) Equipment grounding conductors

(4) ~~In addition to wiring~~ Where the air space below a raised floor is not protected by an automatic fire suppression system , wiring under the raised floor shall be installed in compliance with 725.135(C) , including Type CMP substituting for Types CL2P and CL3P.

(5) Where the air space below a raised floor is protected by an automatic fire suppression system, wiring installed in compliance with 725.135(C) shall be permitted under the raised floor and Types CL2R, CL3R, CL2, and CL3 and substitute cables including CMP, CMR, CM, and CMG installed in accordance with 725.154(A) shall also be permitted ~~under raised floors.~~ . Informational Note: Figure 725.154(A) illustrates the cable substitution hierarchy for Class 2 and Class 3 cables.

(6) Listed Type DP cable having adequate fire-resistant characteristics suitable for use under raised floors of an information technology equipment room

Informational Note: One method of defining *fire resistance* is by establishing that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2011, *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables*. The smoke measurements in the test method are not applicable. Another method of defining *fire resistance* is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*.

Statement of Problem and Substantiation for Public Comment

The development schedule of the 2016 edition of NFPA 75, Standard for the Fire Protection of Information Technology Equipment is about 6 months ahead of the development schedule for NFPA 70. There are pending changes to the wiring requirements in NFPA 75 that will require correlating changes in Article 645.

The text of section 11.3.7 and the explanatory Annex Note A.11.3.7 in NFPA 75-2016 will be:

11.3.7* Signal wiring and cabling, including optical fiber cables, installed in an air space below a raised floor shall be listed.

11.3.7.1 Where the air space below a raised floor is protected by an automatic fire suppression system, signal wiring and cabling listed for plenum, riser and general-purpose use shall be permitted to be installed exposed to the airflow in an air space below a raised floor.

11.3.7.2 Where the air space below a raised floor is not protected by an automatic fire suppression system, only signal wiring and cabling listed for plenum use shall be permitted to be installed exposed to the airflow in an air space below a raised floor.

11.3.7.3 Where the air space below a raised floor is not protected by an automatic fire suppression system, signal wiring and cabling listed for plenum, riser and general-purpose use shall be permitted to be installed in metal raceway in an air space below a raised floor.

A11.3.7* See 9.1.1.3. The installation of general-purpose and riser cables exposed to the airflow in the air space below a raised floor is permitted only where the space is protected by an automatic fire suppression system.

Section 645.5(E) needs to be revised to permit the use on riser and general-purpose cables (Types CL2R, CL3R, OFNR, OFCR, CL2, CL3, OFN and OFC) only where the under floor space has automatic fire suppression in place.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 44-NFPA 70-2015 [Section No. 645.5(E)(3)]	

Related Item

First Revision No. 3354-NFPA 70-2015 [Section No. 645.5(E)]

Submitter Information Verification

Submitter Full Name: STANLEY KAUFMAN
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Affiliation: SPI
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Submittal Date: Wed Jun 24 00:23:03 EDT 2015

Committee Statement

Committee Action: Rejected but held

Resolution: Holding this revision, awaiting the issuance of NFPA 75-2017 for final language.

Public Input No. 729-NFPA 70-2017 [Section No. 645.5(E)(2)]

(2) Installation Requirements for Electrical Supply Cords, Data Cables, Interconnecting Cables, and Grounding Conductors Under a Raised Floor.

The following cords, cables, and conductors shall be permitted to be installed under a raised floor:

(1) Supply cords of listed information technology equipment in accordance with 645.5(B)

(2) Interconnecting cables enclosed in a raceway

(3) Equipment grounding conductors

(4) In addition to wiring installed in compliance with 725.135(C), Types CL2R, CL3R, CL2, and CL3 and substitute cables including CMP, CMR, CM, and CMG installed in accordance with 725.154(A), shall be permitted under raised floors.

Informational Note: Figure 725.154(A) illustrates the cable substitution hierarchy for Class 2 and Class 3 cables.

(5) Listed Type DP cable having adequate fire-resistant characteristics suitable for use under raised floors of an information technology equipment room

Informational Note: One method of defining *fire resistance* is by establishing that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-

~~2011~~

201 **7** , *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables* . The smoke measurements in the test method are not applicable.

Another method of defining *fire resistance* is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as

~~descri?bed~~

described in CSA C22.2 No. 0.3-

~~09~~

14 , *Test Methods for Electrical Wires and Cables* .

Statement of Problem and Substantiation for Public Input

Referenced current editions of national consensus standards.

Submitter Information Verification

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Copyright Assignment

I, Aaron Adamczyk, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am Aaron Adamczyk, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Input No. 3245-NFPA 70-2017 [Section No. 645.5(E)(3)]

(3) Installation Requirements for Optical Fiber Cables Under a Raised Floor.

~~In addition to~~
Where the air space below a raised floor is not protected by an automatic fire suppression system, only optical fiber cables installed in accordance with

~~770~~
770 .113(C) shall be permitted under the raised floor.

Where the air space below a raised floor is protected by an automatic fire suppression system , optical fiber cables installed in accordance with 770.113(C) , Types OFNR, OFCR, OFN, and OFC shall be permitted under the raised

~~floors~~
floor .

Additional Proposed Changes

File Name	Description	Approved
PC_44.pdf	70_PC44	✓

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 44 of the (A2016) Second Draft Report for NFPA 70 and per the Regs. at 4.4.8.3.1.

Substantiation: The development schedule of the 2016 edition of NFPA 75, Standard for the Fire Protection of Information Technology Equipment is about 6 months ahead of the development schedule for NFPA 70. There are pending changes to the wiring requirements in NFPA 75 that will require correlating changes in Article 645.

The text of section 11.3.7 and the explanatory Annex Note A.11.3.7 in NFPA 75-2016 will be:

11.3.7* Signal wiring and cabling, including optical fiber cables, installed in an air space below a raised floor shall be listed.

11.3.7.1 Where the air space below a raised floor is protected by an automatic fire suppression system, signal wiring and cabling listed for plenum, riser and general-purpose use shall be permitted to be installed exposed to the airflow in an air space below a raised floor.

11.3.7.2 Where the air space below a raised floor is not protected by an automatic fire suppression system, only signal wiring and cabling listed for plenum use shall be permitted to be installed exposed to the airflow in an air space below a raised floor.

11.3.7.3 Where the air space below a raised floor is not protected by an automatic fire suppression system, signal wiring and cabling listed for plenum, riser and general-purpose use shall be permitted to be installed in metal raceway in an air space below a raised floor.

A11.3.7* See 9.1.1.3. The installation of general-purpose and riser cables exposed to the airflow in the air space below a raised floor is permitted only where the space is protected by an automatic fire suppression system.

Section 645.5(E) will need to be revised to permit the use on riser and general-purpose cables (Types CL2R, CL3R, OFNR, OFCR, CL2, CL3, OFN and OFC) only where the under floor space has automatic fire suppression in place.

Submitter Information Verification

Submitter Full Name: CMP ON NEC-P12

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Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 04 16:09:21 EDT 2017

Copyright Assignment

I, CMP ON NEC-P12, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am CMP ON NEC-P12, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Comment No. 44-NFPA 70-2015 [Section No. 645.5(E)(3)]

(3) Installation Requirements for Optical Fiber Cables Under a Raised Floor.

~~In addition to~~

(1) Where the air space below a raised floor is not protected by an automatic fire suppression system, only optical fiber cables installed in accordance with 770.113(C) shall be permitted under the raised floor.

(2) Where the air space below a raised floor is protected by an automatic fire suppression system , optical fiber cables installed in accordance with 770.113(C) , Types OFNR, OFCR, OFN, and OFC shall be permitted under the raised

~~floors~~

(1) floor .

Statement of Problem and Substantiation for Public Comment

The development schedule of the 2016 edition of NFPA 75, Standard for the Fire Protection of Information Technology Equipment is about 6 months ahead of the development schedule for NFPA 70. There are pending changes to the wiring requirements in NFPA 75 that will require correlating changes in Article 645.

The text of section 11.3.7 and the explanatory Annex Note A.11.3.7 in NFPA 75-2016 will be:

11.3.7* Signal wiring and cabling, including optical fiber cables, installed in an air space below a raised floor shall be listed.

11.3.7.1 Where the air space below a raised floor is protected by an automatic fire suppression system, signal wiring and cabling listed for plenum, riser and general-purpose use shall be permitted to be installed exposed to the airflow in an air space below a raised floor.

11.3.7.2 Where the air space below a raised floor is not protected by an automatic fire suppression system, only signal wiring and cabling listed for plenum use shall be permitted to be installed exposed to the airflow in an air space below a raised floor.

11.3.7.3 Where the air space below a raised floor is not protected by an automatic fire suppression system, signal wiring and cabling listed for plenum, riser and general-purpose use shall be permitted to be installed in metal raceway in an air space below a raised floor.

A11.3.7* See 9.1.1.3. The installation of general-purpose and riser cables exposed to the airflow in the air space below a raised floor is permitted only where the space is protected by an automatic fire suppression system.

Section 645.5(E) will need to be revised to permit the use on riser and general-purpose cables (Types CL2R, CL3R, OFNR, OFCR, CL2, CL3, OFN and OFC) only where the under floor space has automatic fire suppression in place.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 32-NFPA 70-2015 [Section No. 645.5(E)(2)]	
Related Item	
First Revision No. 3354-NFPA 70-2015 [Section No. 645.5(E)]	

Submitter Information Verification

Submitter Full Name: STANLEY KAUFMAN
Organization: CABLESAFE INCOFS

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Submittal Date: Thu Jun 25 00:34:18 EDT 2015

Committee Statement

Committee Action: Rejected but held
Resolution: Holding this revision, awaiting the issuance of NFPA 75-2017 for final language.

Public Input No. 1067-NFPA 70-2017 [Section No. 645.5(F)]

(F) Securing in Place.

Power raceways, power cables; communications cables, connecting cables, interconnecting raceways and cables, and associated boxes, connectors, plugs, and receptacles that are listed as part of, or for, information technology equipment shall not be required to be secured in place where installed under raised floors. Power cables, communication cables, connecting cables and interconnecting cables, and associated boxes, connectors, plugs and receptacles shall be required to be secured in place when installed above raised floors, such as computer IT rack installations.

Informational Note: Securement requirements for raceways and cables not listed as part of, or for, information technology equipment are found in 300.11.

Statement of Problem and Substantiation for Public Input

Manufactured computer power cables are designed to be installed under raised access floors to allow for flexibility in running branch circuits to IT server racks, computers and computer peripheral equipment. These cables are protected by the raised access floor from physical damage. When computer power cables are installed as part of UPS systems, power distribution or air conditioning equipment without a raised floor, such as network racks on structural floors, or above a computer access floor, the cables can be subject to physical damage if not secured in place. The requirement to secure in place when not under a raised floor provides for an orderly installation and requires the cables to meet other Code Articles for securing in place. Also the term raceway should be added as many of these assemblies consist of seal tight raceways with conductors installed in them.

Submitter Information Verification

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Public Input No. 3488-NFPA 70-2017 [Section No. 645.11]

645.11 Uninterruptible Power Supplies (UPSs).

Except for installations and constructions covered in 645.11(1)or (2), UPS systems installed within the information technology equipment room, and their supply and output circuits, shall comply with 645.10. The disconnecting means shall also disconnect the battery from its load.
Informational Note: Specific electronic equipment disconnecting means requirements for backup battery power sources are found in UL 60950-1-2007, Safety of Information Technology Equipment - Safety - Part 1: General Requirements; or UL 62368-1-2014, Audio/Video, Information and Communication Technology Equipment - Part 1: Safety Requirements.

(1) Installations qualifying under the provisions of Article 685

(2) Power sources limited to 750 volt-amperes or less derived either from UPS equipment or from battery circuits integral to electronic equipment

Statement of Problem and Substantiation for Public Input

The informational note is simply for clarity. UL 60950-1 includes a normative Annex NAE. Annex NAE contains US national safety requirements based on the NEC. Annex NAE, clause 3.4.11 offers product safety design and test guidance on how to comply with NEC Article 645.11. The text of Annex NAE, clause 3.4.11 is as follows:

"For computer room applications, batteries integral to equipment shall incorporate a means for battery disconnect and a means for connection to the remote emergency power off circuit that disconnects the battery power source, except for battery circuits for which (1) the product of the open circuit voltage times the rating of the overcurrent protective device does not exceed 750 VA or (2) any resistive load cannot draw more than 750 VA for more than five minutes after the mains power is disconnected. If connection to the remote emergency power off circuit is required, batteries shall be disconnected within five minutes of activating the remote emergency power off circuit."

Submitter Information Verification

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Public Input No. 3520-NFPA 70-2017 [Section No. 645.18]

645.18 Surge Protection Devices for Critical Operations Data Systems.

~~Surge protection~~ Listed Surge-Protection Devices (SPDs) shall be provided for critical operations data systems.

Statement of Problem and Substantiation for Public Input

Surge-Protection Devices are required to be "listed" per 285.6. Editorial revisions included.

Submitter Information Verification

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Submittal Date: Wed Sep 06 12:27:48 EDT 2017

Public Input No. 2084-NFPA 70-2017 [Section No. 645.27]

645.27 Selective Coordination.

Critical operations data system(s) overcurrent protective devices shall be selectively coordinated with all supply-side overcurrent protective devices.

Selective coordination shall be selected by a licensed professional engineer or other qualified persons engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

Exception No. 1: Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exists on the transformer secondary.

Exception No. 2: Between overcurrent protective devices of the same size (ampere rating) in series.

Statement of Problem and Substantiation for Public Input

Other sections of the Code provide more specific requirements and exceptions that define the procedures for achieving Selective Coordination. The proposed revision provides correlation between this section and the other sections of this Code that require selective coordination.

In an attempt to achieve consistency between all NEC sections that require selective coordination, similar revisions will be proposed for the following sections:
NEC 620.62
NEC 695.3(C)(3)
NEC 700.32
NEC 701.27
NEC 708.54

Submitter Information Verification

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Submittal Date:	Wed Aug 09 23:40:55 EDT 2017

Public Input No. 1917-NFPA 70-2017 [Section No. 646.2]

646.2 Definitions. The definitions in this section shall apply only within this article.

The definitions in 645.2 shall apply. For the purposes of this article, the following additional definition applies.

Modular Data Center (MDC).

Prefabricated units, rated 1000 volts or less, consisting of an outer enclosure housing multiple racks or cabinets of information technology equipment (ITE) (e.g., servers) and various support equipment, such as electrical service and distribution equipment, HVAC systems, and the like.

Informational Note No. 1: A typical construction may use a standard ISO shipping container or other structure as the outer enclosure, racks or cabinets of ITE, service-entrance equipment and power distribution components, power storage such as a UPS, and an air or liquid cooling system. Modular data centers are intended for fixed installation, either indoors or outdoors, based on their construction and resistance to environmental conditions. MDCs can be configured as an all-in-one system housed in a single equipment enclosure or as a system with the support equipment housed in separate equipment enclosures.

Informational Note No. 2: For information on listing requirements for both information technology equipment and communications equipment contained within a modular data center, see UL 60950-1-2014, *Information Technology Equipment — Safety — Part 1: General Requirements,* and UL 62368-1-2012, *Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements*.

Informational Note No. 3: *Modular data centers* as defined in this article are sometimes referred to as containerized data centers.

Informational Note No. 4: Equipment enclosures housing only support equipment (e.g., HVAC or power distribution equipment) that are not part of a specific modular data center are not considered a modular data center as defined in this article.

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of task group appointed by the NEC Correlating Committee. This task group was appointed to identify potential issues in the NEC with respect to how definitions in both Article 100 and the XXX.2 sections of this Code apply. The member of the task group are: David Hittinger, Rich Holub, Chris Hunter, Dave Williams, Chris Porter, Alan Manche, Ken Boyce, John Kovacik, Donny Cook, Dave Kendall and Jim Dollard.

Section 2.2.2.1 of the NEC Style Manual requires that in general definitions that appear in two or more articles be located in Article 100. Section 2.2.2.2 requires that where an individual article contains definition(s), they be located in the second section (XXX.2) of the article. It is extremely important to note that the style manual does not prohibit a definition in the second section of an article from applying elsewhere in the NEC. The style manual clearly states that in general definitions that appear in two or more articles shall be located in Article 100. This has confused many code users in the past. This style manual requirement is accurate and these public inputs are simply an attempt to provide needed clarity. See the example below:

344.2 Definition.
Rigid Metal Conduit (RMC). A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.

The definition of the term “rigid metal conduit” is appropriately located in the article that contains general, installation and construction specifications for this raceway. It is commonly understood that the term “rigid metal conduit” is used in more than one article. There are many articles that contain a single definition that is necessary for application of the contained requirements but will apply elsewhere in the NEC. This occurs in articles that address cable assemblies, raceways, systems and more.
This public input seeks to delete the last sentence in the first paragraph, as it is unnecessary. A new sentence is proposed to simply inform the user of the code that definitions are also found in the second section (XXX.2) of other

articles.
This public input is supplemented with proposed revisions to the second section (XXX.2) of articles that contain definitions. New parent text is proposed for these sections to increase clarity and usability. There are two different scenarios that will be addressed. First, any second section (XXX.2) that contains definitions that apply only within that article will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply only within this article.

Second, any second section (XXX.2) that contains definitions that apply within the individual article and throughout the code will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply within this article and throughout the code.

In a few cases, in the second section (XXX.2) of an Article there are definitions that will apply only in that Article and some that will apply in that Article and throughout the code. New parent text and first level subdivisions are proposed to achieve clarity and usability The combination of these proposed revisions will provide necessary clarity and usability with respect to application of definitions. These actions will also achieve compliance with the NEC Style Manual.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1202-NFPA 70-2017 [Article 100 [Excluding any Sub-Sections]]	

Submitter Information Verification

Submitter Full Name: James Dollard
Organization: IBEW Local Union 98
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Submittal Date: Tue Aug 08 13:52:48 EDT 2017

Public Input No. 2836-NFPA 70-2017 [Section No. 646.3(L)]

(L) Wiring Methods and Materials.

(1) Unless modified elsewhere in this article, wiring methods and materials for power distribution shall comply with Chapter 3. Wiring shall be suitable for its use and installation and shall be listed and labeled.

Exception: This requirement shall not apply to wiring that is part of listed and labeled equipment.

(2) The following wiring methods shall not be permitted:

(3) ~~Integrated gas spacer cable: Type IGS (Article 326)~~

a. Concealed knob-and-tube wiring (Article 394)

b. Messenger-supported wiring (Article 396)

c. Open wiring on insulators (Article 398)

d. Outdoor overhead conductors over 600 volts (Article 399)

(4) Wiring in areas under a raised floor that are constructed and used for ventilation as described in 645.5(E) shall be permitted to use the wiring methods described in 645.5(E)if the conditions of 645.4 are met.

(5) Installation of wiring for remote-control, signaling, and power-limited circuits shall comply with Part III of Article 725.

(6) Installation of optical fiber cables shall comply with Part V of Article 770.

(7) Alternate wiring methods as permitted by Article 645 shall be permitted for MDCs, provided that all of the conditions of 645.4 are met.

Statement of Problem and Substantiation for Public Input

Since IGS cable is not listed, it is not permitted to be used as a building wiring method. The cable has a low ampacity and the minimum conductor size is 250 Kcmil, which makes it impractical and inefficient to be used.
The insulating material, sulfur hexafluoride is used mainly in medium and high voltage utility applications.
Due to lack of listing, impractical use and inefficiency, propose to delete this wiring method throughout the code including Article 326.

Submitter Information Verification

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Submittal Date: Sun Aug 27 23:14:36 EDT 2017

Copyright Assignment

I, MATHHER ABBASSI, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am MATHHER ABBASSI, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Input No. 1515-NFPA 70-2017 [Section No. 647.3]

647.3 General.

Use of a separately derived 120-volt single-phase 3-wire system with 60 volts on each of two ungrounded conductors to an equipment grounding conductor shall be permitted ~~for the purpose of reducing objectionable noise in sensitive electronic equipment locations~~ , provided the following conditions apply:

(1) The system is installed only in commercial or industrial occupancies.

(2) The system's use is restricted to areas under close supervision by qualified personnel.

(3) All of the requirements in 647.4 through 647.8 are met.

Statement of Problem and Substantiation for Public Input

Remove text about 'noise' since this term is not defined. I have submitted PI to remove the same text from: 250.6, 250.94(B), , 250.96(B), and 250.146(D), 406.3, 517.16(B)(2), 647.3, and 647.8

Submitter Information Verification

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Organization: Mike Holt Enterprises Inc

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Submittal Date: Tue Aug 01 13:27:15 EDT 2017

Public Input No. 2415-NFPA 70-2017 [Section No. 647.6(B)]

(B) Grounding Conductors Required.

Permanently wired utilization equipment and receptacles shall be grounded by means of an equipment grounding conductor run with the circuit conductors to an equipment grounding bus prominently marked "Technical Equipment Ground" in the originating branch-circuit panelboard. The equipment grounding bus shall be connected to the grounded conductor on the line side of the separately derived system's disconnecting means. The equipment grounding conductor shall not be smaller than that specified in Table 250.122 and run with the feeder conductors. The technical equipment grounding bus need not be bonded to the panelboard enclosure. Other equipment grounding methods authorized elsewhere in this *Code* shall be permitted where the impedance of the equipment grounding return path does not exceed the impedance of equipment grounding conductors sized and installed in accordance with this article.

Informational Note No. 1: See 250.122 for equipment grounding conductor sizing requirements where circuit conductors are adjusted in size to compensate for voltage drop.

Informational Note No. 2: These requirements limit the impedance of the ground fault return path where only 60 volts apply to a fault condition instead of the usual 120 volts.

Statement of Problem and Substantiation for Public Input

Grounding and bonding still continues to be one of the most misunderstood and misapplied sections of the NEC. Most of the problems can be traced back to using undefined terminology (trade slang in many cases) or incorrect terminology. The term "grounding conductor" is one that is no longer defined. As part of a Correlating Committee Task Force activity on grounding and bonding in general, this term and its related definition was removed from the NEC during the 2008 NEC cycle. The term had been found to be misapplied in a number of instances and the definition of "grounding conductor" was determined to be very close to the definition of "grounding electrode conductor" yet, many uses of the term in previous editions of the NEC were found to be more correctly to be either "equipment grounding conductor", "grounding electrode conductor" or one of the several types of "bonding jumper".

The revised text uses terms defined in the Code and is consistent with the context of the meaning of the section where the revisions are made. The revisions are made to provide clarity, and consistency in terminology usage.

It is requested the Correlating Committee consider a policy or procedures that require a review when a term under the responsibility of a specific Code panel is used by another Code panel. The panel responsible for the term is to review the application to ensure correct usage. It is further requested that when new terms are created that would be identified as under the responsibility of another Code panel that the new term and application be reviewed by the Code panel that would have responsibility for use and application.

Submitter Information Verification

Submitter Full Name: Charles Mello

Organization: Cdcmello Consulting Llc

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Submittal Date: Thu Aug 17 19:02:54 EDT 2017

Copyright Assignment

I, Charles Mello, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am Charles Mello, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Input No. 3594-NFPA 70-2017 [Section No. 647.6(B)]

(B) – **Equipment** Grounding Conductors Required.

Permanently wired utilization equipment and receptacles shall be grounded by means of an equipment grounding conductor run with the circuit conductors, and connected to an equipment grounding bus ~~prominently~~ that is effectively marked “Technical Equipment Ground” in the originating branch-circuit panelboard. The equipment grounding bus shall be connected to the grounded conductor on the line side of disconnecting means supplied by the separately derived ~~system’s disconnecting means~~ system . The equipment grounding conductor shall not be smaller than that specified in Table 250.122 and run with the feeder conductors. The technical equipment grounding bus need not be bonded to the panelboard enclosure. Other grounding methods authorized elsewhere in this *Code* shall be permitted where the impedance of the grounding return path does not exceed the impedance of equipment grounding conductors sized and installed in accordance with this article.

Informational Note No. 1: See 250.122 for equipment grounding conductor sizing requirements where circuit conductors are adjusted in size to compensate for voltage drop.

Informational Note No. 2: These requirements limit the impedance of the ground fault path where only 60 volts apply to a fault condition instead of the usual 120 volts.

Statement of Problem and Substantiation for Public Input

The term “grounding conductor” is not defined in the NEC. Defined grounding and bonding words and terms should be used with rules and should be support by associated definitions. This section appears to be related to equipment grounding conductors, which is the inspiration for this Public Input. Other editorial revisions are to improve clarity and accuracy in meaning. As an example, the separately derived system does not own the disconnecting means, it is supplying it. The word “prominently” has been removed to reduce subjectivity and a vague term and replaced with the word “effectively” which is the intent of this marking.

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Public Input No. 1516-NFPA 70-2017 [Section No. 647.8 [Excluding any Sub-Sections]]

Lighting equipment installed under this article ~~for the purpose of reducing electrical noise originating from lighting equipment~~ shall meet the conditions of 647.8(A) through (C).

Statement of Problem and Substantiation for Public Input

Remove text about 'noise' since this term is not defined. I have submitted PI to remove the same text from: 250.6, 250.94(B), 250.96(B), and 250.146(D), 406.3, 517.16(B)(2), 647.3, and 647.8

Submitter Information Verification

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Public Input No. 1918-NFPA 70-2017 [Section No. 650.2]

650.2 Definitions. The definitions in this section shall apply only within this article.

Electronic Organ.

A musical instrument that imitates the sound of a pipe organ by producing sound electronically.

Informational Note: Most new electronic organs produce sound digitally and are called digital organs.

Pipe Organ.

A musical instrument that produces sound by driving pressurized air (called wind) through pipes selected via a keyboard.

Sounding Apparatus.

The sound-producing part of a pipe organ, including, but not limited to, pipes, chimes, bells, the pressurized air (wind)-producing equipment (blower), associated controls, and power equipment.

Informational Note: The sounding apparatus is also referred to as the “pipe organ chamber.”

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of task group appointed by the NEC Correlating Committee. This task group was appointed to identify potential issues in the NEC with respect to how definitions in both Article 100 and the XXX.2 sections of this Code apply. The member of the task group are: David Hittinger, Rich Holub, Chris Hunter, Dave Williams, Chris Porter, Alan Manche, Ken Boyce, John Kovacik, Donny Cook, Dave Kendall and Jim Dollard.

Section 2.2.2.1 of the NEC Style Manual requires that in general definitions that appear in two or more articles be located in Article 100. Section 2.2.2.2 requires that where an individual article contains definition(s), they be located in the second section (XXX.2) of the article. It is extremely important to note that the style manual does not prohibit a definition in the second section of an article from applying elsewhere in the NEC. The style manual clearly states that in general definitions that appear in two or more articles shall be located in Article 100. This has confused many code users in the past. This style manual requirement is accurate and these public inputs are simply an attempt to provide needed clarity. See the example below:

344.2 Definition.
Rigid Metal Conduit (RMC). A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.

The definition of the term “rigid metal conduit” is appropriately located in the article that contains general, installation and construction specifications for this raceway. It is commonly understood that the term “rigid metal conduit” is used in more than one article. There are many articles that contain a single definition that is necessary for application of the contained requirements but will apply elsewhere in the NEC. This occurs in articles that address cable assemblies, raceways, systems and more.
This public input seeks to delete the last sentence in the first paragraph, as it is unnecessary. A new sentence is proposed to simply inform the user of the code that definitions are also found in the second section (XXX.2) of other articles.
This public input is supplemented with proposed revisions to the second section (XXX.2) of articles that contain definitions. New parent text is proposed for these sections to increase clarity and usability. There are two different scenarios that will be addressed. First, any second section (XXX.2) that contains definitions that apply only within that article will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply only within this article.

Second, any second section (XXX.2) that contains definitions that apply within the individual article and throughout the code will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply within this article and throughout the code.

In a few cases, in the second section (XXX.2) of an Article there are definitions that will apply only in that Article and some that will apply in that Article and throughout the code. New parent text and first level subdivisions are proposed to achieve clarity and usability The combination of these proposed revisions will provide necessary clarity and usability with respect to application of definitions. These actions will also achieve compliance with the NEC Style Manual.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1202-NFPA 70-2017 [Article 100 [Excluding any Sub-Sections]]	

Submitter Information Verification

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Submittal Date: Tue Aug 08 13:58:53 EDT 2017

Public Input No. 730-NFPA 70-2017 [Section No. 650.6(D)]

(D) Cable Covering.

Each cable shall be provided with an outer covering, either overall or on each of any subassemblies of grouped conductors. Tape shall be permitted in place of a covering. Where not installed in metal raceway, the covering shall be resistant to flame spread, or the cable or each cable subassembly shall be covered with a closely wound listed fireproof tape.

Informational Note: One method of determining that cable is resistant to flame spread is by testing the cable to the VW-1 (vertical-wire) flame test in ANSI/UL 1581-~~2011~~ 201 **7** , *Reference Standard for Electrical Wires, Cables and Flexible Cords*.

Statement of Problem and Substantiation for Public Input

Referenced current national consensus standard edition.

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Public Input No. 1958-NFPA 70-2017 [Section No. 660.2]

660.2 Definitions. The definitions in this section shall apply only within this article.

Long-Time Rating.

A rating based on an operating interval of 5 minutes or longer.

Mobile.

X-ray equipment mounted on a permanent base with wheels and/or casters for moving while completely assembled.

Momentary Rating.

A rating based on an operating interval that does not exceed 5 seconds.

Portable.

X-ray equipment designed to be hand-carried.

Transportable.

X-ray equipment that is to be installed in a vehicle or that may be readily disassembled for transport in a vehicle.

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of task group appointed by the NEC Correlating Committee. This task group was appointed to identify potential issues in the NEC with respect to how definitions in both Article 100 and the XXX.2 sections of this Code apply. The member of the task group are: David Hittinger, Rich Holub, Chris Hunter, Dave Williams, Chris Porter, Alan Manche, Ken Boyce, John Kovacik, Donny Cook, Dave Kendall and Jim Dollard.

Section 2.2.2.1 of the NEC Style Manual requires that in general definitions that appear in two or more articles be located in Article 100. Section 2.2.2.2 requires that where an individual article contains definition(s), they be located in the second section (XXX.2) of the article. It is extremely important to note that the style manual does not prohibit a definition in the second section of an article from applying elsewhere in the NEC. The style manual clearly states that in general definitions that appear in two or more articles shall be located in Article 100. This has confused many code users in the past. This style manual requirement is accurate and these public inputs are simply an attempt to provide needed clarity. See the example below:

344.2 Definition.
Rigid Metal Conduit (RMC). A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.

The definition of the term “rigid metal conduit” is appropriately located in the article that contains general, installation and construction specifications for this raceway. It is commonly understood that the term “rigid metal conduit” is used in more than one article. There are many articles that contain a single definition that is necessary for application of the contained requirements but will apply elsewhere in the NEC. This occurs in articles that address cable assemblies, raceways, systems and more.
This public input seeks to delete the last sentence in the first paragraph, as it is unnecessary. A new sentence is proposed to simply inform the user of the code that definitions are also found in the second section (XXX.2) of other articles.
This public input is supplemented with proposed revisions to the second section (XXX.2) of articles that contain definitions. New parent text is proposed for these sections to increase clarity and usability. There are two different scenarios that will be addressed. First, any second section (XXX.2) that contains definitions that apply only within that article will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply only within this article.

Second, any second section (XXX.2) that contains definitions that apply within the individual article and throughout the code will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply within this article and throughout the code.

In a few cases, in the second section (XXX.2) of an Article there are definitions that will apply only in that Article and some that will apply in that Article and throughout the code. New parent text and first level subdivisions are proposed to achieve clarity and usability The combination of these proposed revisions will provide necessary clarity and usability with respect to application of definitions. These actions will also achieve compliance with the NEC Style Manual.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1202-NFPA 70-2017 [Article 100 [Excluding any Sub-Sections]]	

Submitter Information Verification

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Submittal Date: Wed Aug 09 12:02:33 EDT 2017

Public Input No. 1582-NFPA 70-2017 [Section No. 660.5]

660.5 Disconnecting Means.

A disconnecting means of adequate capacity for at least 50 percent of the input required for the momentary rating, or 100 percent of the input required for the long-time rating, of the X-ray equipment, whichever is greater, shall be provided in the supply circuit. The disconnecting means shall be located within sight from the X-ray control and readily accessible.

Exception: The disconnecting means for the X-ray equipment shall not be required under either of the following conditions, provided that the controller disconnecting means is lockable open in accordance with 110.25:

(1) Where such a location of the disconnecting means for the X-ray equipment is impracticable or introduces additional or increased hazards to persons or property

(2) In industrial installations, with written safety procedures, where conditions of maintenance and supervision ensure that only qualified persons service the equipment

Statement of Problem and Substantiation for Public Input

Aligns the text with 110.25

Submitter Information Verification

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Submittal Date: Tue Aug 01 20:03:14 EDT 2017

Public Input No. 924-NFPA 70-2017 [Section No. 660.6(B)]

(B) Feeder Conductors.

The ~~rated~~ ampacity of conductors and the rating of overcurrent devices of a feeder for two or more branch circuits supplying X-ray units shall not be less than 100 percent of the momentary demand rating [as determined by 660.6(A)] of the two largest X-ray apparatus plus 20 percent of the momentary ratings of other X-ray apparatus.

Informational Note: The minimum conductor size for branch and feeder circuits is also governed by voltage regulation requirements. For a specific installation, the manufacturer usually specifies minimum distribution transformer and conductor sizes, rating of disconnect means, and overcurrent protection.

Statement of Problem and Substantiation for Public Input

This public input is the work of an Ampacity Task Group. The task group consisted of the following members: Thomas Domitrovich, Dave Mercier, Christine Porter, Derrick Atkins, and Christel Hunter.

The Task Group identified the use of the word rated to describe ampacity is not appropriate when addressing the ampacity of a conductor. The use of the term "rating" generally applies to equipment where as ampacity applies to conductors.

Ampacity of a conductor is defined as part of Article 100 as "The maximum current, in amperes, that a conductor can carry continuously under the conditions of use without exceeding its temperature rating." Tables 310.15(B)(16) through (21) establish the ampacity of conductors under specified conditions of use.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 919-NFPA 70-2017 [Definition: Overload.]	Removal of the term "rated" as it pertains to ampacity
Public Input No. 920-NFPA 70-2017 [Section No. 450.6(A)(1)]	Removal of the term "rated" as it pertains to ampacity
Public Input No. 921-NFPA 70-2017 [Section No. 450.6(A)(2)]	Removal of the term "rated" as it pertains to ampacity
Public Input No. 922-NFPA 70-2017 [Section No. 530.18(E)]	Removal of the term "rated" as it pertains to ampacity
Public Input No. 923-NFPA 70-2017 [Section No. 630.31(A)]	Removal of the term "rated" as it pertains to ampacity
Public Input No. 949-NFPA 70-2017 [Section No. 230.23]	Removal of the term "rated" as it pertains to ampacity
Public Input No. 950-NFPA 70-2017 [Section No. 310.15(B)(7)]	Removal of the term "rated" as it pertains to ampacity
Public Input No. 2140-NFPA 70-2017 [Section No. 210.19(A) [Excluding any Sub-Sections]]	Removal of the term "rated" as it pertains to ampacity
Public Input No. 2144-NFPA 70-2017 [Section No. 725.144(A)]	Removal of the term "rated" as it pertains to ampacity

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Public Input No. 1961-NFPA 70-2017 [Section No. 665.2]

665.2 Definitions. The definitions in this section shall apply only within this article.

Applicator.

The device used to transfer energy between the output circuit and the object or mass to be heated.

Converting Device.

That part of the heating equipment that converts input mechanical or electrical energy to the voltage, current, and frequency used for the heating applicator. A converting device consists of equipment using line frequency, all static multipliers, oscillator-type units using vacuum tubes, inverters using solid-state devices, or motor-generator equipment.

Dielectric Heating.

Heating of a nominally insulating material due to its own dielectric losses when the material is placed in a varying electric field.

Heating Equipment.

As used in this article, any equipment that is used for heating purposes and whose heat is generated by induction or dielectric methods.

Induction Heating, Melting, and Welding.

The heating, melting, or welding of a nominally conductive material due to its own I^2R losses when the material is placed in a varying electromagnetic field.

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of task group appointed by the NEC Correlating Committee. This task group was appointed to identify potential issues in the NEC with respect to how definitions in both Article 100 and the XXX.2 sections of this Code apply. The member of the task group are: David Hittinger, Rich Holub, Chris Hunter, Dave Williams, Chris Porter, Alan Manche, Ken Boyce, John Kovacik, Donny Cook, Dave Kendall and Jim Dollard.

Section 2.2.2.1 of the NEC Style Manual requires that in general definitions that appear in two or more articles be located in Article 100. Section 2.2.2.2 requires that where an individual article contains definition(s), they be located in the second section (XXX.2) of the article. It is extremely important to note that the style manual does not prohibit a definition in the second section of an article from applying elsewhere in the NEC. The style manual clearly states that in general definitions that appear in two or more articles shall be located in Article 100. This has confused many code users in the past. This style manual requirement is accurate and these public inputs are simply an attempt to provide needed clarity. See the example below:

344.2 Definition.
Rigid Metal Conduit (RMC). A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.

The definition of the term “rigid metal conduit” is appropriately located in the article that contains general, installation and construction specifications for this raceway. It is commonly understood that the term “rigid metal conduit” is used in more than one article. There are many articles that contain a single definition that is necessary for application of the contained requirements but will apply elsewhere in the NEC. This occurs in articles that address cable assemblies, raceways, systems and more.
This public input seeks to delete the last sentence in the first paragraph, as it is unnecessary. A new sentence is proposed to simply inform the user of the code that definitions are also found in the second section (XXX.2) of other articles.
This public input is supplemented with proposed revisions to the second section (XXX.2) of articles that contain definitions. New parent text is proposed for these sections to increase clarity and usability. There are two different scenarios that will be addressed. First, any second section (XXX.2) that contains definitions that apply only within that article will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply only within this article.

Second, any second section (XXX.2) that contains definitions that apply within the individual article and throughout the code will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply within this article and throughout the code.

In a few cases, in the second section (XXX.2) of an Article there are definitions that will apply only in that Article and some that will apply in that Article and throughout the code. New parent text and first level subdivisions are proposed to achieve clarity and usability The combination of these proposed revisions will provide necessary clarity and usability with respect to application of definitions. These actions will also achieve compliance with the NEC Style Manual.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1202-NFPA 70-2017 [Article 100 [Excluding any Sub-Sections]]	

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Public Input No. 3598-NFPA 70-2017 [Section No. 665.23]

665.23 ~~Warning~~ Hazard Labels or Signs.

~~Warning~~ Danger labels or signs that read "DANGER — HIGH VOLTAGE — KEEP OUT" shall be attached to the equipment and shall be plainly visible where persons might come in contact with energized parts when doors are open or closed or when panels are removed from compartments containing over 150 volts ac or dc. The ~~warning sign~~ sign (s) or label(s) shall comply with 110.21(B).

Statement of Problem and Substantiation for Public Input

Editorial revisions for clarity. The signal word "Danger" is required in the sign. This prompts specific requirements to comply with ANSI Z535.4. The revisions remove the inconsistency relative to using the word "Warning" and provides the appropriate general reference to 110.21(B) which triggers other important requirements for such signs such as the need for durability for the environment.

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Public Input No. 1962-NFPA 70-2017 [Section No. 668.2]

668.2 Definitions. The definitions in this section shall apply only within this article.

Cell Line.

An assembly of electrically interconnected electrolytic cells supplied by a source of direct-current power.

Cell Line Attachments and Auxiliary Equipment.

As applied to this article, a term that includes, but is not limited to, auxiliary tanks; process piping; ductwork; structural supports; exposed cell line conductors; conduits and other raceways; pumps, positioning equipment, and cell cutout or bypass electrical devices. Auxiliary equipment includes tools, welding machines, crucibles, and other portable equipment used for operation and maintenance within the electrolytic cell line working zone.

In the cell line working zone, auxiliary equipment includes the exposed conductive surfaces of ungrounded cranes and crane-mounted cell-servicing equipment.

Electrically Connected.

A connection capable of carrying current as distinguished from connection through electromagnetic induction.

Electrolytic Cell.

A tank or vat in which electrochemical reactions are caused by applying electric energy for the purpose of refining or producing usable materials.

Electrolytic Cell Line Working Zone.

The space envelope wherein operation or maintenance is normally performed on or in the vicinity of exposed energized surfaces of electrolytic cell lines or their attachments.

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of task group appointed by the NEC Correlating Committee. This task group was appointed to identify potential issues in the NEC with respect to how definitions in both Article 100 and the XXX.2 sections of this Code apply. The member of the task group are: David Hittinger, Rich Holub, Chris Hunter, Dave Williams, Chris Porter, Alan Manche, Ken Boyce, John Kovacik, Donny Cook, Dave Kendall and Jim Dollard.

Section 2.2.2.1 of the NEC Style Manual requires that in general definitions that appear in two or more articles be located in Article 100. Section 2.2.2.2 requires that where an individual article contains definition(s), they be located in the second section (XXX.2) of the article. It is extremely important to note that the style manual does not prohibit a definition in the second section of an article from applying elsewhere in the NEC. The style manual clearly states that in general definitions that appear in two or more articles shall be located in Article 100. This has confused many code users in the past. This style manual requirement is accurate and these public inputs are simply an attempt to provide needed clarity. See the example below:

344.2 Definition.
Rigid Metal Conduit (RMC). A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.

The definition of the term “rigid metal conduit” is appropriately located in the article that contains general, installation and construction specifications for this raceway. It is commonly understood that the term “rigid metal conduit” is used in more than one article. There are many articles that contain a single definition that is necessary for application of the contained requirements but will apply elsewhere in the NEC. This occurs in articles that address cable assemblies, raceways, systems and more.
This public input seeks to delete the last sentence in the first paragraph, as it is unnecessary. A new sentence is proposed to simply inform the user of the code that definitions are also found in the second section (XXX.2) of other articles.
This public input is supplemented with proposed revisions to the second section (XXX.2) of articles that contain definitions. New parent text is proposed for these sections to increase clarity and usability. There are two different scenarios that will be addressed. First, any second section (XXX.2) that contains definitions that apply only within that

article will contain parent text as follows:

XXX.2 Definitions. The definitions in this section shall apply only within this article.

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Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1202-NFPA 70-2017 [Article 100 [Excluding any Sub-Sections]]	

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Public Input No. 2416-NFPA 70-2017 [Section No. 668.11]

668.11 Direct-Current Cell Line Process Power Supply.

(A) Not Grounded.

The direct-current cell line process power-supply conductors shall not be required to be grounded.

(B) Metal Enclosures Grounded.

All metal enclosures of power-supply apparatus for the direct-current cell line process operating with a power supply over 50 volts shall be grounded by either of the following means:

(1) Through protective relaying equipment

(2) By a minimum 2/0 AWG copper grounding electrode conductor or a conductor of equal or greater conductance

(C) Grounding Requirements.

The grounding electrode connections required by 668.11(B) shall be installed in accordance with 250.8, 250.10, 250.12, 250.68, and 250.70.

Statement of Problem and Substantiation for Public Input

Grounding and bonding still continues to be one of the most misunderstood and misapplied sections of the NEC. Most of the problems can be traced back to using undefined terminology (trade slang in many cases) or incorrect terminology. The term “grounding conductor” is one that is no longer defined. As part of a Correlating Committee Task Force activity on grounding and bonding in general, this term and its related definition was removed from the NEC during the 2008 NEC cycle. The term had been found to be misapplied in a number of instances and the definition of “grounding conductor” was determined to be very close to the definition of “grounding electrode conductor” yet, many uses of the term in previous editions of the NEC were found to be more correctly to be either “equipment grounding conductor”, “grounding electrode conductor” or one of the several types of “bonding jumper”.

The revised text uses terms defined in the Code and is consistent with the context of the meaning of the section where the revisions are made. The revisions are made to provide clarity, and consistency in terminology usage.

It is requested the Correlating Committee consider a policy or procedures that require a review when a term under the responsibility of a specific Code panel is used by another Code panel. The panel responsible for the term is to review the application to ensure correct usage. It is further requested that when new terms are created that would be identified as under the responsibility of another Code panel that the new term and application be reviewed by the Code panel that would have responsibility for use and application.

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Public Input No. 2417-NFPA 70-2017 [Section No. 668.21(B)]

(B) Noninterchangeability.

Receptacles and their mating plugs for ungrounded equipment shall not have provision for ~~a~~ an equipment grounding conductor and shall be of a configuration that prevents their use for equipment required to be grounded.

Statement of Problem and Substantiation for Public Input

Grounding and bonding still continues to be one of the most misunderstood and misapplied sections of the NEC. Most of the problems can be traced back to using undefined terminology (trade slang in many cases) or incorrect terminology. The term “grounding conductor” is one that is no longer defined. As part of a Correlating Committee Task Force activity on grounding and bonding in general, this term and its related definition was removed from the NEC during the 2008 NEC cycle. The term had been found to be misapplied in a number of instances and the definition of “grounding conductor” was determined to be very close to the definition of “grounding electrode conductor” yet, many uses of the term in previous editions of the NEC were found to be more correctly to be either “equipment grounding conductor”, “grounding electrode conductor” or one of the several types of “bonding jumper”.

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Public Input No. 2232-NFPA 70-2017 [Section No. 670.2]

670.2 Definition. The definition in this section shall apply within this article and throughout the code.

Industrial Machinery (Machine).

A power-driven machine (or a group of machines working together in a coordinated manner), not portable by hand while working, that is used to process material by cutting; forming; pressure; electrical, thermal, or optical techniques; lamination; or a combination of these processes. It can include associated equipment used to transfer material or tooling, including fixtures, to assemble/disassemble, to inspect or test, or to package. [The associated electrical equipment, including the logic controller(s) and associated software or logic together with the machine actuators and sensors, are considered as part of the industrial machine.]

Statement of Problem and Substantiation for Public Input

This public input is submitted on behalf of task group appointed by the NEC Correlating Committee. This task group was appointed to identify potential issues in the NEC with respect to how definitions in both Article 100 and the XXX.2 sections of this Code apply. The member of the task group are: David Hittinger, Rich Holub, Chris Hunter, Dave Williams, Chris Porter, Alan Manche, Ken Boyce, John Kovacik, Donny Cook, Dave Kendall and Jim Dollard.

Section 2.2.2.1 of the NEC Style Manual requires that in general definitions that appear in two or more articles be located in Article 100. Section 2.2.2.2 requires that where an individual article contains definition(s), they be located in the second section (XXX.2) of the article. It is extremely important to note that the style manual does not prohibit a definition in the second section of an article from applying elsewhere in the NEC. The style manual clearly states that in general definitions that appear in two or more articles shall be located in Article 100. This has confused many code users in the past. This style manual requirement is accurate and these public inputs are simply an attempt to provide needed clarity. See the example below:

344.2 Definition.
Rigid Metal Conduit (RMC). A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.

The definition of the term “rigid metal conduit” is appropriately located in the article that contains general, installation and construction specifications for this raceway. It is commonly understood that the term “rigid metal conduit” is used in more than one article. There are many articles that contain a single definition that is necessary for application of the contained requirements but will apply elsewhere in the NEC. This occurs in articles that address cable assemblies, raceways, systems and more.
This public input seeks to delete the last sentence in the first paragraph, as it is unnecessary. A new sentence is proposed to simply inform the user of the code that definitions are also found in the second section (XXX.2) of other articles.
This public input is supplemented with proposed revisions to the second section (XXX.2) of articles that contain definitions. New parent text is proposed for these sections to increase clarity and usability. There are two different scenarios that will be addressed. First, any second section (XXX.2) that contains definitions that apply only within that article will contain parent text as follows:

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Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1202-NFPA 70-2017 [Article 100 [Excluding any Sub-Sections]]	

Submitter Information Verification

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Public Input No. 731-NFPA 70-2017 [Section No. 670.3(A)]

(A) Permanent Nameplate.

A permanent nameplate shall be attached to the control equipment enclosure or machine and shall be plainly visible after installation. The nameplate shall include the following information:

(1) Supply voltage, number of phases, frequency, and full-load current

(2) Maximum ampere rating of the short-circuit and ground-fault protective device

(3) Ampere rating of largest motor, from the motor nameplate, or load

(4) Short-circuit current rating of the machine industrial control panel based on one of the following:

(5) Short-circuit current rating of a listed and labeled machine control enclosure or assembly

(6) Short-circuit current rating established utilizing an approved method

Informational Note: UL 508A-

~~2001~~

a.

20 **17** , Supplement SB, is an example of an approved method.

(7) Electrical diagram number(s) or the number of the index to the electrical drawings

The full-load current shown on the nameplate shall not be less than the sum of the full-load currents required for all motors and other equipment that may be in operation at the same time under normal conditions of use. Where unusual type loads, duty cycles, and so forth require oversized conductors or permit reduced-size conductors, the required capacity shall be included in the marked “full-load current.” Where more than one incoming supply circuit is to be provided, the nameplate shall state the preceding information for each circuit.

Statement of Problem and Substantiation for Public Input

Referenced current edition of referenced national consensus standard.

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Public Input No. 2848-NFPA 70-2017 [Section No. 670.5]

670.5 Short-Circuit Current Rating.

(1)

Industrial machinery shall not be installed where the available short-circuit current exceeds its short-circuit current rating as marked in accordance with 670.3(A)(4).

(2)

~~Industrial machinery shall be legibly marked in the field with the maximum~~ The available short-circuit current ~~. The field marking(s) shall include the date~~ at the industrial machinery and the date of the short-circuit current calculation was performed ~~and be of sufficient durability to withstand the environment involved.~~ shall be documented and made available to those authorized to inspect the installation.

Statement of Problem and Substantiation for Public Input

The revised language aligns this requirement with those in Articles 409 and 440. The requirements should be consistent for inspection authorities.

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Public Input No. 1277-NFPA 70-2017 [Sections 670.5(1), 670.5(2)]

Sections 670.5(1), 670.5(2)

(1)

Industrial machinery shall not be installed where the available ~~short-circuit~~ fault current exceeds its short-circuit current rating as marked in accordance with 670.3(A)(4).

(2)

Industrial machinery shall be legibly marked in the field with the ~~maximum~~ available ~~short-circuit~~ fault current. The field marking(s) shall include the date the ~~short-circuit~~ available fault current calculation was performed and be of sufficient durability to withstand the environment involved.

Statement of Problem and Substantiation for Public Input

The Fault Current Working Group was formed to support the Correlating Committee's Usability Task Group. Members of the Fault Current Working Group included Scott Blizard, Jim Dollard, Carl Fredericks, Jeff Hidaka, Chris Jensen, Alan Manche, and Vince Saporita. The goal of the Fault Current Working Group was to analyze the usage of the terms "short-circuit" and "fault" throughout the NEC, and submit Public Inputs, as appropriate, to improve clarity, consistency, and usability.

While "short-circuit" and "fault" have been used interchangeably throughout the NEC (and the whole electrical industry), there are subtle differences between the two. This has resulted in confusion and a lack of consistency. Thus, numerous related Public Inputs have been submitted by the Working Group.

The definition of "Fault Current, Available (Available Fault Current)" is taken from SR8 of NFPA70E-2018. The definition ("The largest amount of current capable of being delivered at a point on the system during a short-circuit condition") clarifies that "available fault current" is the highest short-circuit current that can flow at a particular point in the electrical system. The Informational Note, also taken from SR8 of NFPA70E-2018, ("A short-circuit can occur during abnormal conditions such as a fault between circuit conductors or a ground fault. See Figure 100.0") provides an example of the relationship between "short-circuit" and "fault". Figure 100.0, also from SR8 of NFPA70E-2018, helps explain the difference between "available fault current", "short-circuit current rating", and "interrupting rating".

"Available short-circuit current" and "short-circuit current" are changed to "available fault current" for improved consistency.

"Maximum" is deleted in front of "maximum available fault current" (and "maximum available short-circuit current") because the new definition of "available fault current" clearly includes the maximum (largest). The only exceptions, which remain unchanged, are in 250.4(A)(5) and 250.4(B)(3), where the word "maximum" is still appropriate and is necessary for a complete understanding of the requirement.

Equipment and component fault current ratings, short-circuit ratings, and short-circuit withstand ratings are changed to "short-circuit current ratings", in agreement with equipment and component listing standards. The only exceptions, which remain unchanged, are for switch "fault closing ratings", also to be in agreement with existing equipment and component listing standards.

Finally, "Short-circuit current calculation" is replaced with "available fault current calculation", improving consistency.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1246-NFPA 70-2017 [Definition: Coordination, Selective (Selective Coordination...]	PI from Fault Current Working Group
Public Input No. 1247-NFPA 70-2017 [New Definition after Definition: Externally Operable.]	PI from Fault Current Working Group
Public Input No. 1248-NFPA 70-2017 [New Definition after Definition: Externally Operable.]	PI from Fault Current Working Group
Public Input No. 1249-NFPA 70-2017 [Section No. 110.24(A)]	PI from Fault Current Working Group
Public Input No. 1250-NFPA 70-2017 [Section No. 110.24(B)]	PI from Fault Current Working Group

Public Input No. 1251-NFPA 70-2017 [Section No. 225.52(B)]	PI from Fault Current Working Group
Public Input No. 1252-NFPA 70-2017 [Section No. 230.82]	PI from Fault Current Working Group
Public Input No. 1253-NFPA 70-2017 [Section No. 230.205(B)]	PI from Fault Current Working Group
Public Input No. 1254-NFPA 70-2017 [Section No. 368.258]	PI from Fault Current Working Group
Public Input No. 1255-NFPA 70-2017 [Section No. 430.99]	PI from Fault Current Working Group
Public Input No. 1256-NFPA 70-2017 [Section No. 445.11]	PI from Fault Current Working Group
Public Input No. 1257-NFPA 70-2017 [Section No. 480.7(D)]	PI from Fault Current Working Group
Public Input No. 1258-NFPA 70-2017 [Section No. 490.21(A)(4)]	PI from Fault Current Working Group
Public Input No. 1259-NFPA 70-2017 [Section No. 490.21(B)(2)]	PI from Fault Current Working Group
Public Input No. 1260-NFPA 70-2017 [Section No. 490.21(C)(3)]	PI from Fault Current Working Group
Public Input No. 1263-NFPA 70-2017 [Section No. 490.21(D)(2)]	PI from Fault Current Working Group
Public Input No. 1264-NFPA 70-2017 [Section No. 490.21(D)(4)]	PI from Fault Current Working Group
Public Input No. 1265-NFPA 70-2017 [Section No. 490.21(E) [Excluding any Sub-Sections]]	PI from Fault Current Working Group
Public Input No. 1266-NFPA 70-2017 [Section No. 440.10(B)]	PI from Fault Current Working Group
Public Input No. 1267-NFPA 70-2017 [Section No. 505.7(F)]	PI from Fault Current Working Group
Public Input No. 1271-NFPA 70-2017 [Section No. 545.13]	PI from Fault Current Working Group
Public Input No. 1272-NFPA 70-2017 [Section No. 550.15(K)]	PI from Fault Current Working Group
Public Input No. 1273-NFPA 70-2017 [Section No. 551.47(O)]	PI from Fault Current Working Group
Public Input No. 1274-NFPA 70-2017 [Section No. 552.48(N)]	PI from Fault Current Working Group
Public Input No. 1275-NFPA 70-2017 [Section No. 620.16(B)]	PI from Fault Current Working Group
Public Input No. 1276-NFPA 70-2017 [Section No. 620.51(D)(2)]	PI from Fault Current Working Group
Public Input No. 1281-NFPA 70-2017 [Section No. 690.8(A)(1)]	PI from Fault Current Working Group
Public Input No. 1282-NFPA 70-2017 [Section No. 690.8(D)]	PI from Fault Current Working Group
Public Input No. 1283-NFPA 70-2017 [Section No. 690.9(A)]	PI from Fault Current Working Group
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Public Input No. 1286-NFPA 70-2017 [Section No. 690.32]	PI from Fault Current Working Group
Public Input No. 1287-NFPA 70-2017 [Section No. 695.6(I)]	PI from Fault Current Working Group
Public Input No. 1288-NFPA 70-2017 [Section No. 700.4(A)]	PI from Fault Current Working Group
Public Input No. 1289-NFPA 70-2017 [Section No. 701.4]	PI from Fault Current Working Group
Public Input No. 1290-NFPA 70-2017 [Section No. 702.4(A)]	PI from Fault Current Working Group
Public Input No. 1291-NFPA 70-2017 [Section No. 705.22]	PI from Fault Current Working Group
Public Input No. 1292-NFPA 70-2017 [Section No. 705.31]	PI from Fault Current Working Group
Public Input No. 1293-NFPA 70-2017 [Section No. 705.65(A)]	PI from Fault Current Working Group
Public Input No. 1294-NFPA 70-2017 [Section No. 706.7(D)]	PI from Fault Current Working Group
Public Input No. 1295-NFPA 70-2017 [Section No. 712.65]	PI from Fault Current Working Group
Public Input No. 1296-NFPA 70-2017 [Section No. 712.72]	PI from Fault Current Working Group
Public Input No. 1297-NFPA 70-2017 [Definition: Feeder Neutral Conductor]	PI from Fault Current Working Group

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Public Input No. 2849-NFPA 70-2017 [Section No. 670.6]

670.6 Surge Protection.

Industrial machinery with safety interlock ~~circuits~~ control devices not effectively isolated from voltage surges on the incoming supply circuit shall have surge protection installed.

Informational Note: One method of achieving effective isolation from voltage surges is by supplying safety interlock control devices from the isolated secondary circuit of a control circuit transformer or power supply.

Statement of Problem and Substantiation for Public Input

The requirement added in the 2017 does not account for machinery where safety interlock control circuits are located in isolated secondary circuits which effectively isolates them from incoming voltage surges. In addition, manufacturers of safety interlock control devices typically state in the instructions for use specific power limitation requirements which must be met to ensure proper operation and known fault behavior.

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Public Input No. 382-NFPA 70-2017 [Section No. 685.1]

685.1 Scope.

This article covers integrated electrical systems, other than unit equipment, in which orderly shutdown is necessary to ensure safe operation. An *integrated electrical system* as used in this article is a unitized segment of an industrial wiring system where all of the following conditions are met:

(1) An orderly shutdown is required to minimize personnel hazard and equipment damage.

(2) The conditions of maintenance and supervision ensure that qualified persons service the system. The name(s) of the qualified person(s) shall be kept in a permanent record at the office of the establishment in charge of the completed installation.

A person designated as a qualified person shall possess the skills and knowledge related to the construction and operation of the electrical equipment and installation and shall have received documented safety training on the hazards involved. Documentation of their qualifications shall be on file with the office of the establishment in charge of the completed installation.

(3) Effective ~~safeguards acceptable to the~~ safeguards approved by the authority having jurisdiction are established and maintained.

Statement of Problem and Substantiation for Public Input

This change is not a technical change. It is intended to be editorial only. This revision is merely an attempt to provide consistent terminology throughout the code. I believe the better word to use in this instance is the term “approved” since it is defined in Article 100 and used throughout the code and generally understood by installers and inspectors alike.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 381-NFPA 70-2017 [Section No. 503.155(A)]	use of term "approved" versus "acceptable"
Public Input No. 380-NFPA 70-2017 [Section No. 708.6(B)]	use of term "approved" versus "acceptable"
Public Input No. 379-NFPA 70-2017 [Section No. 701.12(B)(3)]	use of term "approved" versus "acceptable"
Public Input No. 378-NFPA 70-2017 [Section No. 700.3(B)]	use of term "approved" versus "acceptable"
Public Input No. 377-NFPA 70-2017 [Section No. 701.12(B)(1)]	use of term "approved" versus "acceptable"
Public Input No. 376-NFPA 70-2017 [Section No. 701.3(B)]	use of term "approved" versus "acceptable"
Public Input No. 375-NFPA 70-2017 [Section No. 700.12(B)(3)]	use of term "approved" versus "acceptable"
Public Input No. 374-NFPA 70-2017 [Section No. 700.12(B)(1)]	use of term "approved" versus "acceptable"
Public Input No. 373-NFPA 70-2017 [Section No. 820.44(D)]	use of term "approved" versus "acceptable"

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