

**Public Input No. 3085, Assigned to Code-Making  
Panel 1, Refer to Code-Making Panels 2 - 18**



**Public Input No. 3085-NFPA 70-2023 [ Global Input ]**

**This Global Public Input is for all Technical Committees and review their informational notes and the requirements in the NEC Style Manual Section 2.1.10 for informational notes.**

## Statement of Problem and Substantiation for Public Input

This Global Public Input is for all Technical Committees and review their informational notes and the requirements in the NEC Style Manual Section 2.1.10 for informational notes.

2.1.10.3 Format. Informational notes shall be structured as shown in the example, using the word "See" followed by the reference standard, the title of the standard and section if used, and an explanation for the reference.

Example:

"See" "Referenced Standard", "Standard Title", "Section Number", "Explanation of the reference"

Informational Note: See NFPA 101, Life Safety Code, 7.8, for illumination of means of egress.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

## Submitter Information Verification

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**Submittal Date:** Tue Aug 29 11:15:17 EDT 2023

**Committee:** NEC-P01

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**Public Input No. 3086, Assigned to Code-Making  
Panel 2, Refer to Code Making Panels 3 - 18**



**Public Input No. 3086-NFPA 70-2023 [ Global Input ]**

**This Global Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. Articles may need to be revised to comply with the NEC Style Manual Section 2.2 for Numbering Conventions.**

**Statement of Problem and Substantiation for Public Input**

This Global Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document.

Articles may need to be revised to comply with the NEC Style Manual Section 2.2 for Numbering Conventions. The Changes in 2.2.1 are requirements that may need to be revised.

2.2.1 Parallel Numbering Required. Technical committees shall use the following section numbers for the same purposes within articles. This requirement shall not apply to Articles 90, 100, and 110. If the article does not contain listing or reconditioning requirements, the subdivisions shall not be included in the article.

Required Parallel Numbering Format

XXX.1 Scope.

XXX.2 Listing Requirements.

XXX.3 Reconditioned Equipment.

XXX.3(A) Permitted to be Installed.

XXX.3(B) Not Permitted to be Installed.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

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**Public Input No. 3099, Assigned to Code-Making Panel 15, Refer to Code-Making Panels 3, 4, 6, 10, 11, 12, 13, 14, 16, 17 and 18**



**Public Input No. 3099-NFPA 70-2023 [ Global Input ]**

Add Informational Notes to Scopes identifying Article specific and/or important definitions in one of the following formats:

Format A – the style used in NFPA Link’s Enhanced Content material:

Informational Note No. x: Definitions. Each of the following terms has a definition in Article 100 that is unique to its use in “Article xxx”:

Term 1

Term 2

Term 3

...

If needed:

Informational Note No. y: Definitions. Each of the following terms has a definition in Article 100 that appears in several articles but is important in its use in “Article xxx”:

Term a

Term b

Term c

...

Format B – the style used in several places within the NEC itself:

Informational Note: See Article 100 for definitions of Term 1, Term 2, and Term 3 . . .

## Statement of Problem and Substantiation for Public Input

The change to locations of definitions in the 2023 Edition of the NEC was controversial for many people because it reduced usability. Even though other NFPA codes and standards use this structure and was stated as a justification to the change in the ‘NEC Style Manual’ (some NFPA codes and standards include definitions within articles \*), many believe this relocation leads to confusion among users, especially for those articles that are specialty topics – i.e., the articles in Chapters 5 through 8. There are over 37 pages of definitions in Article 100 to search through.

Common language terms often have more specific meanings within an article. One only needs to look at the multiple definitions for ‘Portable Equipment’ to get a sense of this issue. While the term ‘Directly Controlled Emergency Luminaire’ used in Article 700 seems self-explanatory, the actual definition is quite important. Without the proximate reference within Article 700, that distinction is not clear.

Article 200 does the following:

200.1 Scope.

This article provides requirements for the following:

- (1) Identification of terminals
- (2) Grounded conductors in premises wiring systems
- (3) Identification of grounded conductors

Informational Note: See Article 100 for definitions of Grounded Conductor, Equipment Grounding Conductor, and Grounding Electrode Conductor.

Article 380 also adds a definition reference in an Informational Note to the scope.

There are approximately 30 references to Article 100 definitions within specific sections of the Code.

Under the current structure, important specialty definitions are lost in the sheer size of the Article 100 list. The usability of the NEC has been damaged, and users of specialty articles in Chapters 5 through 8 need help with this structure.

To restore the usability of the NEC, what is needed is a way to clearly identify and point to specialty definitions in a standardized location within articles (like we used to have with the .2 sections), while leaving the definitions themselves in Article 100. NFPA Link and the NEC Handbook add this information as Enhanced Content. Additionally, this “definition identification” model has proven its usability in other codes such as NFPA 1, NFPA 99, and NFPA 101. The NEC deserves no less.

\* Example: NFPA 101 – Section 6.1.2.1 ‘Assembly Occupancy’ is one of several definitions in an Article; and in this instance it is duplicated from 3.3.205.2]. In fact, there are multiple definitions throughout NFPA 101.

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**Public Input No. 4050, Assigned to Code-Making Panel  
10, Refer to Code-Making Panels 1 - 9 and 11 - 18**



**Public Input No. 4050-NFPA 70-2023 [ Global Input ]**

**Review the terms regarding overcurrent protection and determine if the correct term is being used.**

- (1) Branch-Circuit Overcurrent Protective Device**
- (2) Current-Limiting Overcurrent Protective Device**
- (3) Current-Limiting**
- (4) Current-Limiting Overcurrent**
- (5) Overcurrent Protection**
- (6) Overcurrent Protection Device**
- (7) Overcurrent Protective Device**
- (8) Supplementary Overcurrent Protective Device**
- (9) Supplementary Overcurrent Protection**

**Statement of Problem and Substantiation for Public Input**

The defined terms regarding overcurrent protection need to be reviewed by all code making panels and determine if the correct term is being used. The code has too many terms regarding overcurrent protection, some that are defined and some that are not defined. These terms are often used interchangeably in the wrong context.

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**Committee:** NEC-P10

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**Public Input No. 4287, Assigned to Code-Making  
Panel 1, Refer to Code-Making Panels 2 - 18**



**Public Input No. 4287-NFPA 70-2023 [ Global Input ]**

Clearly identify any requirements which are not applicable to DC circuits by incorporating the recommended terminology as applicable:

“Applicable to...[ac][single-phase][three-phase][wye][delta] circuits only”.

“Not applicable to dc circuits”

“[Volts] ac only”

Other terminology that clearly applies to a specific ac (or dc) application, such as through a defined term or unique equipment.

## Statement of Problem and Substantiation for Public Input

This Public Input is submitted on behalf of a Correlating Committee DC Task Group consisting of Danish Zia, Jason Fisher, Randy Dollar, Larry Wildermuth, Scott Higgins, Scott Harding, Mark Earley, Jason Hopkins, Christopher Vance, Chad Kennedy and Derrick Atkins. This Public Input, along with other Public Inputs, was developed with the goal of improving usability and accuracy on requirements associated with DC circuits.

DC residential and commercial installations are emerging in the electrical infrastructure and are expected to be a growing alternative to the traditional AC utility fed building. Examples include the US DOE Grid-interactive Efficient Buildings project (Note 1), the Purdue University RENEWW house (Note 2), and a DC Microgrid community in Vermont (Note 3). These installations may involve buildings that are distributed entirely with DC, or with an AC/DC hybrid distribution.

Although DC electrical distribution topics are covered by the NEC, the focus of most residential and commercial installations and the Code has historically been AC power. Many requirements are written using AC terminology or referencing only AC technology, but without distinction as to whether the requirement is also applicable to DC circuits or installations. Usage of terms such as “2-wire” and “3-wire”, or listing AC only voltages as informative references without appropriate mandatory language or further clarification may not provide sufficient clarity as to whether a requirement applies to DC circuits. This may leave the AHJ and other users of the Code confused. This public input recommends that such requirements be reviewed and clarified using the recommended terminology proposed.

Note 1 - <https://www.energy.gov/sites/default/files/2020/09/f79/bto-geb-project-summary-093020.pdf>

Note 2 - <https://engineering.purdue.edu/ME/News/2022/purdue-house-runs-entirely-on-dc-power>

Note 3 - [https://www.efficiencyvermont.com/Media/Default/docs/white-papers/Energy\\_Resilience.pdf](https://www.efficiencyvermont.com/Media/Default/docs/white-papers/Energy_Resilience.pdf)

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**Committee:** NEC-P01

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## Public Input No. 1583-NFPA 70-2023 [ Global Input ]

Delete wording, "commercial and non-commercial" every where it is used together to describe a location. There is nothing else left that I know of, just let the requirements stand by themselves without the need to clarify it is required in "commercial and non-commercial" loacations.

### Statement of Problem and Substantiation for Public Input

Just cleaning up unnecessary wording. Where other requirements in the code are meant for all locations we don't list them "commercial and non-commercial".

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**Committee:** NEC-P07





## Public Input No. 3910-NFPA 70-2023 [ Article 100 ]

### Article 100 Definitions

**Scope.** This article contains only those definitions essential to the application of this Code. It is not intended to include commonly defined general terms or commonly defined technical terms from related codes and standards. An article number in parentheses following the definition indicates that the definition only applies to that article.

Informational Note: A definition that is followed by a reference in brackets has been extracted from one of the following standards. Only editorial changes were made to the extracted text to make it consistent with this Code.

- (1) NFPA 30A-2021, *Code for Motor Fuel Dispensing Facilities and Repair Garages*
- (2) NFPA 33-2021, *Standard for Spray Application Using Flammable or Combustible Materials*
- (3) NFPA 75-2020, *Standard for the Fire Protection of Information Technology Equipment*
- (4) NFPA 79-2021, *Electrical Standard for Industrial Machinery*
- (5) NFPA 99-2021, *Health Care Facilities Code*
- (6) NFPA 101<sup>®</sup>-2022, *Life Safety Code*<sup>®</sup>
- (7) NFPA 110-2019, *Standard for Emergency and Standby Power Systems*
- (8) NFPA 303-2021, *Fire Protection Standard for Marinas and Boatyards*
- (9) NFPA 307-2021, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*
- (10) NFPA 499-2021, *Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*
- (11) NFPA 501-2022, *Standard on Manufactured Housing*
- (12) NFPA 790-2021, *Standard for Competency of Third-Party Field Evaluation Bodies*
- (13) NFPA 1192-2021, *Standard on Recreational Vehicles*

**Accessible (as applied to equipment).**

Capable of being reached for operation, renewal, and inspection. (CMP-1)

**Accessible (as applied to wiring methods).**

Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in or blocked by the structure, other electrical equipment, other building systems, or finish of the building. (CMP-1)

**Accessible, Readily (Readily Accessible).**

Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to take actions such as to use tools (other than keys), to climb over or under, to remove obstacles, or to resort to portable ladders, and so forth. (CMP-1)

Informational Note: Use of keys is a common practice under controlled or supervised conditions and a common alternative to the ready access requirements under such supervised conditions as provided elsewhere in the NEC.

**Adapter.**

A device used to adapt a circuit from one configuration of an attachment plug or receptacle to another configuration with the same current rating. (520) (CMP-15)

**Adjustable Speed Drive.**

Power conversion equipment that provides a means of adjusting the speed of an electric motor. (CMP-11)

Informational Note: A variable frequency drive is one type of electronic adjustable speed drive that controls the rotational speed of an ac electric motor by controlling the frequency and voltage of the electrical power supplied to the motor.

**Adjustable Speed Drive System.**

A combination of an adjustable speed drive, its associated motor(s), and auxiliary equipment. (CMP-11)

**Aircraft Painting Hangar.**

An aircraft hangar constructed for the express purpose of spraying, coating, and/or dipping applications and provided with dedicated ventilation supply and exhaust. (CMP-14)

**Alternate Power Source.**

One or more generator sets, or battery systems where permitted, intended to provide power during the interruption of the normal electrical service; or the public utility electrical service intended to provide power during interruption of service normally provided by the generating facilities on the premises. [ 99: 3.3.4] (517) (CMP-15)

**Ambulatory Health Care Occupancy.**

An occupancy used to provide services or treatment simultaneously to four or more patients that provides, on an outpatient basis, one or more of the following:

- (1) Treatment for patients that renders the patients incapable of taking action for self-preservation under emergency conditions without the assistance of others.
- (2) Anesthesia that renders the patients incapable of taking action for self-preservation under emergency conditions without the assistance of others.
- (3) Treatment for patients who, due to the nature of their injury or illness, are incapable of taking action for self-preservation under emergency conditions without the assistance of others.

[ 101 : 3.3.198.1] (517) (CMP-15)

**Ampacity.**

The maximum current, in amperes, that a conductor can carry continuously under the conditions of use without exceeding its temperature rating. (CMP-6)

**Amplifier (Audio Amplifier) (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 to denote an audio amplifier. (640) (CMP-12)

**Appliance.**

Utilization equipment, generally other than industrial, that is fastened in place, stationary, or portable; is normally built in a standardized size or type; and is installed or connected as a unit to perform one or more functions such as clothes washing, air-conditioning, food mixing, deep frying, and so forth. (CMP-17)

**Applicator.**

The device used to transfer energy between the output circuit and the object or mass to be heated. (665) (CMP-12)

**Approved.**

Acceptable to the authority having jurisdiction. (CMP-1)

**Arc-Fault Circuit Interrupter (AFCI).**

A device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected. (CMP-2)

**Array.**

A mechanically and electrically integrated grouping of modules with support structure, including any attached system components such as inverter(s) or dc-to-dc converter(s) and attached associated wiring. (690) (CMP-4)

**Askarel.**

A generic term for a group of nonflammable synthetic chlorinated hydrocarbons used as electrical insulating media. (CMP-9)

Informational Note: Askarels of various compositional types are used. Under arcing conditions, the gases produced, while consisting predominantly of noncombustible hydrogen chloride, can include varying amounts of combustible gases, depending on the askarel type.

**Associated Apparatus.**

Apparatus in which the circuits are not necessarily intrinsically safe themselves but that affects the energy in the intrinsically safe circuits and is relied on to maintain intrinsic safety. Such apparatus is one of the following:

- (1) Electrical apparatus that has an alternative type of protection for use in the appropriate hazardous (classified) location
- (2) Electrical apparatus not so protected that shall not be used within a hazardous (classified) location

(CMP-14)

Informational Note No. 1: Associated apparatus has identified intrinsically safe connections for intrinsically safe apparatus and also might have connections for nonintrinsically safe apparatus.

Informational Note No. 2: An example of associated apparatus is an intrinsic safety barrier, which is a network designed to limit the energy (voltage and current) available to the protected circuit in the hazardous (classified) location under specified fault conditions.

Informational Note No. 3: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*; ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”*; and ANSI/ISA RP 12.06.01, *Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation — Part 1: Intrinsic Safety*, for additional information.

**Associated Nonincendive Field Wiring Apparatus.**

Apparatus in which the circuits are not necessarily nonincendive themselves but that affects the energy in nonincendive field wiring circuits and is relied on to maintain nonincendive energy levels. Such apparatus is one of the following:

- (1) Electrical apparatus that has an alternative type of protection for use in the appropriate hazardous (classified) location
- (2) Electrical apparatus not so protected that shall not be used within a hazardous (classified) location

(CMP-14)

Informational Note No. 1: Associated nonincendive field wiring apparatus has designated associated nonincendive field wiring apparatus connections for nonincendive field wiring apparatus and also might have connections for other electrical apparatus.

Informational Note No. 2: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Attachment Fitting, Weight-Supporting (WSAF) (Weight-Supporting Attachment Fitting).**

A device that, by insertion into a weight-supporting ceiling receptacle, establishes a connection between the conductors of the attached utilization equipment and the branch-circuit conductors connected to the weight-supporting ceiling receptacle. (CMP-18)

Informational Note No. 1: A weight-supporting attachment fitting is different from an attachment plug because no cord is associated with the fitting. A weight-supporting attachment fitting in combination with a weight-supporting ceiling receptacle secures the associated utilization equipment in place and supports its weight.

Informational Note No. 2: See ANSI/NEMA WD 6, *American National Standard for Wiring Devices — Dimensional Specifications*, for the standard configuration of weight-supporting attachment fittings and related weight-supporting ceiling receptacles.

**Attachment Plug (Plug Cap) (Plug).**

A device that, by insertion in a receptacle, establishes a connection between the conductors of the attached flexible cord and the conductors connected permanently to the receptacle. (CMP-18)

**Audio Autotransformer.**

A transformer with a single winding and multiple taps intended for use with an amplifier loudspeaker signal output. (640) (CMP-12)

**Audio Signal Processing Equipment (Audio 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 Article 640, the terms equipment and audio equipment are assumed to be equivalent to audio signal processing equipment. (640) (CMP-12)

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 (using analog or digital techniques) that have nonhazardous levels of voltage or current.

**Audio System.**

The totality of all equipment and interconnecting wiring used to fabricate a fully functional audio signal processing, amplification, and reproduction system. (640) (CMP-12)

**Audio Transformer.**

A transformer with two or more electrically isolated windings and multiple taps intended for use with an amplifier loudspeaker signal output. (640) (CMP-12)

**Authority Having Jurisdiction (AHJ).**

An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure. (CMP-1)

Informational Note: The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

**Automatic.**

Performing a function without the necessity of human intervention. (CMP-1)

**Bathroom.**

An area including a sink with one or more of the following: a toilet, a urinal, a tub, a shower, a bidet, or similar plumbing fixtures. (CMP-2)

**Battery.**

A single cell or a group of cells connected together electrically in series, in parallel, or a combination of both. (CMP-13)

**Battery, Flow. (Flow Battery)**

An energy storage component that stores its active materials in the form of one or two electrolytes external to the reactor interface. When in use, the electrolytes are transferred between reactor and storage tanks. (706) (CMP-13)

Informational Note: Three commercially available flow battery technologies are zinc air, zinc bromine, and vanadium redox, sometimes referred to as *pumped electrolyte ESS*.

**Battery, Sealed. (Sealed Battery)**

A battery that has no provision for the routine addition of water or electrolyte or for external measurement of electrolyte specific gravity and might contain pressure relief venting. (CMP-13)

**Battery, Stationary Standby. (Stationary Standby Battery)**

A battery that spends the majority of the time on continuous float charge or in a high state of charge, in readiness for a discharge event. (CMP-13)

Informational Note: Uninterruptible Power Supply (UPS) batteries are an example that falls under this definition.

**Battery-Powered Lighting Units.**

Individual unit equipment for backup illumination consisting of a rechargeable battery; a battery-charging means; provisions for one or more lamps mounted on the equipment, or with terminals for remote lamps, or both; and a relaying device arranged to energize the lamps automatically upon failure of the supply to the unit equipment. (517) (CMP-15)

**Berth.**

The water space to be occupied by a boat or other vessel alongside or between bulkheads, piers, piles, fixed and floating docks, or any similar access structure. [ **303: 3.3.2**] (555) (CMP-7)

Informational Note: See the definition of *Slip* for additional information.

**Bipolar Circuit.**

A dc circuit that is comprised of two monopole circuits, each having an opposite polarity connected to a common reference point. (CMP-4)

**Block.**

A square or portion of a city, town, or village enclosed by streets and including the alleys so enclosed, but not any street. (800) (CMP-16)

**Boatyard.**

A facility used for constructing, repairing, servicing, hauling from the water, storing (on land and in water), and launching of boats. [ **303: 3.3.3**] (555) (CMP-7)

**Bodies of Water, Artificially Made. (Artificially Made Bodies of Water)**

Bodies of water that have been constructed or modified to fit some decorative or commercial purpose such as, but not limited to, aeration ponds, fish farm ponds, storm retention basins, treatment ponds, and irrigation (channel) facilities. Water depths may vary seasonally or be controlled. (682) (CMP-17)

**Bodies of Water, Natural. (Natural Bodies of Water)**

Bodies of water such as lakes, streams, ponds, rivers, and other naturally occurring bodies of water, which may vary in depth throughout the year. (682) (CMP-17)

**Bonded (Bonding).**

Connected to establish electrical continuity and conductivity. (CMP-5)

**Bonding Conductor (Bonding Jumper).**

A conductor that ensures the required electrical conductivity between metal parts that are required to be electrically connected. (CMP-5)

**Bonding Jumper, Equipment. (Equipment Bonding Jumper)**

The connection between two or more portions of the equipment grounding conductor. (CMP-5)

**Bonding Jumper, Main. (Main Bonding Jumper)**

The connection between the grounded circuit conductor and the equipment grounding conductor, or the supply-side bonding jumper, or both, at the service. (CMP-5)

**Bonding Jumper, Supply-Side. (Supply-Side Bonding Jumper)**

A conductor installed on the supply side of a service or within a service equipment enclosure(s), or for a separately derived system, that ensures the required electrical conductivity between metal parts required to be electrically connected. (CMP-5)

**Bonding Jumper, System. (System Bonding Jumper)**

The connection between the grounded circuit conductor and the supply-side bonding jumper, or the equipment grounding conductor, or both, at a separately derived system. (CMP-5)

**Border Light.**

A permanently installed overhead strip light. (520) (CMP-15)

**Bottom Shield.**

A protective layer that is installed between the floor and flat conductor cable (Type FCC) to protect the cable from physical damage and may or may not be incorporated as an integral part of the cable. (324) (CMP-6)



**Branch Circuit (Branch-Circuit).**

The circuit conductors between the final overcurrent device protecting the circuit and the outlet(s). (CMP-2)

**Branch Circuit, Appliance. (Appliance Branch Circuit)**

A branch circuit that supplies energy to one or more outlets to which appliances are to be connected and that has no permanently connected luminaires that are not a part of an appliance. (CMP-2)

**Branch Circuit, General-Purpose. (General-Purpose Branch Circuit)**

A branch circuit that supplies two or more receptacles or outlets for lighting and appliances. (CMP-2)

**Branch Circuit, Individual. (Individual Branch Circuit)**

A branch circuit that supplies only one utilization equipment. (CMP-2)

**Branch Circuit, Motor. (Motor Branch Circuit)**

The circuit conductors, including equipment, between the motor branch-circuit short-circuit and ground-fault protective device and an individual motor. (CMP-11)

**Branch Circuit, Multiwire. (Multiwire Branch Circuit)**

A branch circuit that consists of two or more ungrounded conductors that have a voltage between them, and a neutral conductor that has equal voltage between it and each ungrounded conductor of the circuit and that is connected to the neutral conductor of the system. (CMP-2)

**Branch-Circuit Selection Current (BCSC).**

The value in amperes to be used instead of the rated-load current in determining the ratings of motor branch-circuit conductors, disconnecting means, controllers, and branch-circuit short-circuit and ground-fault protective devices wherever the running overload protective device permits a sustained current greater than the specified percentage of the rated-load current. The value of branch-circuit selection current will always be equal to or greater than the marked rated-load current. (440) (CMP-11)

**Breakout Assembly.**

An adapter used to connect a multipole connector containing two or more branch circuits to multiple individual branch-circuit connectors. (520) (CMP-15)

**Broadband.**

Wide bandwidth data transmission that transports multiple signals, protocols, and traffic types over various media types. (CMP-16)

**Building.**

A structure that stands alone or that is separated from adjoining structures by fire walls. (CMP-1)

**Building, Floating. (Floating Building)**

A building that floats on water, is moored in a permanent location, and has a premises wiring system served through connection by permanent wiring to an electrical supply system not located on the premises. (CMP-7)

**Building, Manufactured. (Manufactured Building)**

Any building that is of closed construction and is made or assembled in manufacturing facilities on or off the building site for installation, or for assembly and installation on the building site, other than manufactured homes, mobile homes, park trailers, or recreational vehicles. (545) (CMP-7)



**Building Component.**

Any subsystem, subassembly, or other system designed for use in or integral with or as part of a structure, which can include structural, electrical, mechanical, plumbing, and fire protection systems, and other systems affecting health and safety. (545) (CMP-7)

**Building System.**

Plans, specifications, and documentation for a system of manufactured building or for a type or a system of building components, which can include structural, electrical, mechanical, plumbing, and fire protection systems, and other systems affecting health and safety, and including such variations thereof as are specifically permitted by regulation, and which variations are submitted as part of the building system or amendment thereto. (545) (CMP-7)

**Bulkhead.**

A vertical structural wall, usually of stone, timber, metal, concrete, or synthetic material, constructed along, and generally parallel to, the shoreline to retain earth as an extension of the upland, and often to provide suitable water depth at the waterside face. [ 303: 3.3.5] (555) (CMP-7)

**Bull Switch.**

An externally operated wall-mounted safety switch that can contain overcurrent protection and is designed for the connection of portable cables and cords. (530) (CMP-15)

**Bundled.**

Cables or conductors that are tied, wrapped, taped, or otherwise periodically bound together. (520) (CMP-15)

**Busbar.**

A noninsulated conductor electrically connected to the source of supply and physically supported on an insulator providing a power rail for connection to utilization equipment, such as sensors, actuators, A/V devices, low-voltage luminaire assemblies, and similar electrical equipment. (393) (CMP-18)

**Busbar Support.**

An insulator that runs the length of a section of suspended ceiling bus rail that serves to support and isolate the busbars from the suspended grid rail. (393) (CMP-18)

**Busway.**

A raceway consisting of a metal enclosure containing factory-mounted, bare or insulated conductors, which are usually copper or aluminum bars, rods, or tubes. (CMP-8)

**Cabinet.**

An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung. (CMP-9)

**Cable, Abandoned. (Abandoned Cable)**

Installed cable that is not terminated at equipment other than a termination fitting or a connector and is not identified for future use with a tag. (CMP-16)

Informational Note: See 640.6(B) , 645.5(G) , 722.25 , 760.25 , 770.25 , and 800.25 for requirements covering the removal of abandoned cables.

**Cable, Armored (Type AC). (Armored Cable)**

A fabricated assembly of insulated conductors in a flexible interlocked metallic armor. (CMP-6)

**Cable, Circuit Integrity (CI). (Circuit Integrity Cable)**

Cable(s) marked with the suffix “-CI” used for remote-control, signaling, power-limited, fire alarm, optical fiber, or communications systems that supply critical circuits to ensure survivability for continued circuit operation for a specified time under fire conditions. (CMP-3)

Informational Note: See 728.4 for power circuits installed for survivability.

**Cable, Coaxial. (Coaxial Cable)**

A cylindrical assembly composed of a conductor centered inside a metallic tube or shield, separated by a dielectric material, and usually covered by an insulating jacket. (CMP-16)

**Cable, Festoon. (Festoon Cable)**

Single- and multiple-conductor cable intended for use and installation where flexibility is required. (610) (CMP-12)

**Cable, Flat Conductor (Type FCC). (Flat Conductor Cable)**

Three or more separate flat copper conductors placed horizontally edge-to-edge and enclosed within an insulating assembly. (324) (CMP-6)

**Cable, Instrumentation Tray (Type ITC). (Instrumentation Tray Cable)**

A factory assembly of two or more insulated conductors, with or without an equipment grounding conductor(s), enclosed in a nonmetallic sheath. (CMP-3)

**Cable, Integrated Gas Spacer (Type IGS). (Integrated Gas Spacer Cable)**

A factory assembly of one or more conductors, each individually insulated and enclosed in a loose fit, nonmetallic flexible conduit as an integrated gas spacer cable rated 0 volts through 600 volts. (CMP-6)

**Cable, Limited Use. (Limited-Use Cable)**

Cables that are intended to be used with protection such as a raceway or for specific restricted applications. (722) (CMP-3)

**Cable, Medium Voltage (Type MV). (Medium Voltage Cable)**

A single or multiconductor solid dielectric insulated cable rated 2001 volts up to and including 35,000 volts, nominal. (CMP-6)

**Cable, Metal Clad (Type MC). (Metal Clad Cable)**

A factory assembly of one or more insulated circuit conductors with or without optical fiber members enclosed in an armor of interlocking metal tape, or a smooth or corrugated metallic sheath. (CMP-6)

**Cable, Metallic Conductor. (Metallic Conductor Cable)**

A factory assembly of two or more conductors having an overall covering. (CMP-16)

**Cable, Mineral-Insulated, Metal-Sheathed (Type MI). (Mineral-Insulated, Metal-Sheathed Cable)**

A factory assembly of one or more conductors insulated with a highly compressed refractory mineral insulation and enclosed in a liquidtight and gastight continuous copper or alloy steel sheath. (CMP-6)

**Cable, Nonmetallic-Sheathed.**

A factory assembly of two or more insulated conductors enclosed within an overall nonmetallic jacket. (CMP-6)

**Cable, Nonmetallic-Sheathed (Type NM).**

Insulated conductors enclosed within an overall nonmetallic jacket. (CMP-6)

**Cable, Nonmetallic-Sheathed (Type NMC).**

Insulated conductors enclosed within an overall, corrosion resistant, nonmetallic jacket. (CMP-6)

**Cable, Optical Fiber. (Optical Fiber Cable)**

A factory assembly or field assembly of one or more optical fibers having an overall covering. (CMP-16)

Informational Note: A field-assembled optical fiber cable is an assembly of one or more optical fibers within a jacket. The jacket, without optical fibers, is installed in a manner similar to conduit or raceway. Once the jacket is installed, the optical fibers are inserted into the jacket, completing the cable assembly.

**Cable, Optical Fiber, Conductive. (Conductive Optical Fiber Cable)**

A factory assembly of one or more optical fibers having an overall covering and containing non-current-carrying conductive member(s) such as metallic strength member(s), metallic vapor barrier(s), metallic armor, or metallic sheath. (CMP-16)

**Cable, Optical Fiber, Hybrid. (Hybrid Optical Fiber Cable)**

A cable containing optical fibers and current-carrying electrical conductors. (CMP-16)

**Cable, Optical Fiber, Nonconductive. (Nonconductive Optical Fiber Cable)**

A factory assembly of one or more optical fibers having an overall covering and containing no electrically conductive materials. (CMP-16)

**Cable, Optical Fiber, Protected. (Protected Optical Fiber Cable)**

Optical fiber cable protected from releasing optical radiation into the atmosphere during normal operating conditions and foreseeable malfunctions by additional armoring, conduit, cable tray, or raceway. (CMP-14)

Informational Note: See ANSI/UL 60079-28, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*, for additional information.

**Cable, Portable Power Feeder. (Portable Power Feeder Cable)**

One or more flexible shielded insulated power conductors enclosed in a flexible covering rated from 2001 to 25,000 volts. (CMP-6)

**Cable, Power and Control Tray (Type TC). (Power and Control Tray Cable)**

A factory assembly of two or more insulated conductors, with or without associated bare or covered equipment grounding conductors, under a nonmetallic jacket. (CMP-6)

**Cable, Power-Limited Tray (Type PLTC). (Power-Limited Tray Cable)**

A factory assembly of two or more insulated conductors rated at 300 volts, with or without associated bare or insulated equipment grounding conductors, under a nonmetallic jacket. (CMP-3)

**Cable, Service. (Service Cable)**

Service conductors made up in the form of a cable. (CMP-10)

**Cable, Service Entrance. (Service Entrance Cable)**

A single conductor or multiconductor cable provided with an overall covering, primarily used for services. (CMP-6)

**Cable, Service Entrance (Type SE).**

Service-entrance cable having a flame-retardant, moisture-resistant covering. (CMP-6)

**Cable, Service Entrance (Type USE).**

Service-entrance cable, identified for underground use, having a moisture-resistant covering, but not required to have a flame-retardant covering. (CMP-6)

**Cable, Type P.**

A factory assembly of one or more insulated flexible tinned copper conductors, with associated equipment grounding conductor(s), with or without a braided metallic armor and with an overall nonmetallic jacket. (CMP-6)

**Cable, Under Carpet. (Under Carpet Cable)**

Cables that are intended to be used under carpeting, floor covering, modular tiles, and planks. (722) (CMP-3)

**Cable, Underground Feeder and Branch-Circuit (Type UF). (Underground Feeder and Branch-Circuit Cable)**

A factory assembly of one or more insulated conductors with an integral or an overall covering of nonmetallic material suitable for direct burial in the earth. (CMP-6)

**Cable Assembly, Flat (Type FC). (Flat Cable Assembly)**

An assembly of parallel conductors formed integrally with an insulating material web specifically designed for field installation in surface metal raceway. (CMP-6)

**Cable Bundle.**

A group of cables that are tied together or in contact with one another in a closely packed configuration for at least 1.0 m (40 in.). (CMP-3)

Informational Note: Random or loose installation of individual cables can result in less heating. Combining of the cables can result in less heat dissipation and more signal cross talk between cables.

**Cable Connector.**

A connector designed to join flat conductor cables (Type FCC) without using a junction box. (324) (CMP-6)

**Cable Connector [as applied to hazardous (classified) locations].**

An electrical device that is part of a cable assembly and that, by insertion of two mating configurations, establishes a connection between the conductors of the cable assembly and the conductors of a fixed piece of equipment. (CMP-14)

Informational Note No. 1: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for information on the use of cable connectors.

Informational Note No. 2: Cable connectors in other than hazardous (classified) locations are referred to as male and female fittings.

Informational Note No. 3: See ANSI/UL 2238, *Cable Assemblies and Fittings for Industrial Control and Signal Distribution*, and ANSI/UL 2237, *Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery*, for examples of standards on male and female fittings in other than hazardous (classified) locations.

**Cable Joint.**

A connection consisting of an insulation system and a connector where two (or more) medium voltage (Type MV) cables are joined together. (CMP-6)

**Cable Management System.**

An apparatus designed to control and organize lengths of cable or cord. (CMP-12)

**Cable Routing Assembly.**

A single channel or connected multiple channels, as well as associated fittings, forming a structural system that is used to support and route communications wires and cables, optical fiber cables, data cables associated with information technology and communications equipment, Class 2, Class 3, and Type PLTC cables, and power-limited fire alarm cables in plenum, riser, and general-purpose applications. (CMP-16)

**Cable Sheath.**

A single or multiple layers of a protective covering that holds and protects the conductors or optical fibers, or both, contained inside. (CMP-16)

**Cable System, Fire-Resistive. (Fire-Resistive Cable System)**

A cable and components used to ensure survivability of critical circuits for a specified time under fire conditions. (CMP-3)

**Cable System, Flat Conductor. (Flat Conductor Cable System)**

A complete wiring system for branch circuits that is designed for installation under carpet squares. (324) (CMP-6)

Informational Note: The FCC system includes Type FCC cable and associated shielding, connectors, terminators, adapters, boxes, and receptacles.

**Cable Termination.**

A connection consisting of an insulation system and a connector and installed on a medium voltage (Type MV) cable to connect from a cable to a device, such as equipment. (CMP-6)

**Cable Tray System.**

A unit or assembly of units or sections and associated fittings forming a structural system used to securely fasten or support cables and raceways. (CMP-8)

**Cablebus.**

An assembly of units or sections with insulated conductors having associated fittings forming a structural system used to securely fasten or support conductors and conductor terminations in a completely enclosed, ventilated, protective metal housing. This assembly is designed to carry fault current and to withstand the magnetic forces of such current. (CMP-8)

Informational Note: Cablebus is ordinarily assembled at the point of installation from the components furnished or specified by the manufacturer in accordance with instructions for the specific job.

**Cell (as applied to batteries).**

The basic electrochemical unit, characterized by an anode and a cathode, used to receive, store, and deliver electrical energy. (CMP-13)

**Cell, Sealed. (Sealed Cell)**

A cell that has no provision for the routine addition of water or electrolyte or for external measurement of electrolyte specific gravity and might contain pressure relief venting. (CMP-13)

**Cell Line.**

An assembly of electrically interconnected electrolytic cells supplied by a source of direct-current power. (CMP-12)

**Cell Line Attachments and Auxiliary Equipment.**

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. (668) (CMP-12)

**Charge Controller.**

Equipment that controls dc voltage or dc current, or both, and that is used to charge a battery or other energy storage device. (CMP-13)

**Charger Power Converter.**

The device used to convert energy from the power grid to a high-frequency output for wireless power transfer. (625) (CMP-12)

**Child Care Facility.**

A building or structure, or portion thereof, for educational, supervisory, or personal care services for more than four children 7 years old or less. (406) (CMP-18)

**Circuit Breaker.**

A device designed to open and close a circuit by nonautomatic means and to open the circuit automatically on a predetermined overcurrent without damage to itself when properly applied within its rating. (CMP-10)

Informational Note: The automatic opening means can be integral, direct acting with the circuit breaker, or remote from the circuit breaker.

**Circuit Breaker, Adjustable. (Adjustable Circuit Breaker)**

A qualifying term indicating that the circuit breaker can be set to trip at various values of current, time, or both, within a predetermined range. (CMP-10)

**Circuit Breaker, Instantaneous Trip. (Instantaneous Trip Circuit Breaker)**

A qualifying term indicating that no delay is purposely introduced in the tripping action of the circuit breaker. (CMP-10)

**Circuit Breaker, Inverse Time. (Inverse Time Circuit Breaker)**

A qualifying term indicating that there is a delay purposely introduced in the tripping action of the circuit breaker, and the delay decreases as the magnitude of the current increases. (CMP-10)

**Circuit Breaker, Nonadjustable. (Nonadjustable Circuit Breaker)**

A qualifying term indicating that the circuit breaker does not have any adjustment to alter the value of the current at which it will trip or the time required for its operation. (CMP-10)

**Class 1 Circuit.**

The portion of the wiring system between the load side of the Class 1 power source and the connected equipment. (CMP-3)

**Class 2 Circuit.**

The portion of the wiring system between the load side of a Class 2 power source and the connected equipment. Due to its power limitations, a Class 2 circuit considers safety from a fire initiation standpoint and provides acceptable protection from electric shock. (CMP-3)

**Class 3 Circuit.**

The portion of the wiring system between the load side of a Class 3 power source and the connected equipment. Due to its power limitations, a Class 3 circuit considers safety from a fire initiation standpoint. Since higher levels of voltage and current than for Class 2 are permitted, additional safeguards are specified to provide protection from an electric shock hazard that could be encountered. (CMP-3)

**Class 4 Circuit.**

The portion of the wiring system between the load side of a Class 4 transmitter and the Class 4 receiver or Class 4 utilization equipment, as appropriate. Due to the active monitoring and control of the voltage and current provided, a Class 4 circuit considers safety from a fire initiation standpoint and provides acceptable protection from electric shock. (726) (CMP-3)

Informational Note: A Class 4 circuit is also commonly referred to as a fault-managed power circuit.

**Class 4 Device.**

Any active device connected to the Class 4 circuit; examples include a Class 4 transmitter, a Class 4 receiver, or Class 4 utilization equipment. (CMP-3)



**Class 4 Power System.**

An actively monitored and controlled system consisting of one or more Class 4 transmitters and one or more Class 4 receivers connected by a cabling system. (CMP-3)

**Class 4 Receiver.**

A device that accepts Class 4 power and converts it for use by utilization equipment. (CMP-3)

**Class 4 Transmitter.**

A device that sources Class 4 power. (726) (CMP-3)

Informational Note: A Class 4 transmitter is different from traditional power sources in that it monitors the line for faults (both line-to-line and line-to-ground) and ceases power transmission if a fault is sensed.

**Class 4 Utilization Equipment.**

Devices that are directly powered by a Class 4 transmitter without the need for a separate Class 4 receiver (the receiver is integrated into the equipment). (CMP-3)

**Closed Construction.**

Any building, building component, assembly, or system manufactured in such a manner that all concealed parts of processes of manufacture cannot be inspected after installation at the building site without disassembly, damage, or destruction. (545) (CMP-7)

**Clothes Closet.**

A nonhabitable room or space intended primarily for storage of garments and apparel. (CMP-1)

**Clothes Closet Storage Space.**

The area within a clothes closet in which combustible materials can be kept. (410) (CMP-18)

**Collector Rings.**

An assembly of slip rings for transferring electric energy from a stationary to a rotating member. (675) (CMP-7)

**Combiner (DC) (dc Combiner) (Direct-Current Combiner)**

An enclosure that includes devices used to connect two or more PV system dc circuits in parallel. (690) (CMP-4)

**Combustible Dust.**

Solid particles that are 500  $\mu\text{m}$  or smaller (i.e., material passing a U.S. No. 35 Standard Sieve as defined in ASTM E11-17, *Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves*) that can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature. [ 499: 3.3.3] (CMP-14)

Informational Note: See ASTM E1226, *Standard Test Method for Explosibility of Dust Clouds*; ISO 6184-1, *Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air*; or ANSI/UL 80079-20-2, *Explosive Atmospheres — Part 20-2: Material Characteristics — Combustible Dusts Test Methods*, for procedures for determining the explosibility of dusts. Historically, explosibility has been described as presenting a flash fire or explosion hazard. It could be understood that potential hazards due to the formation of an explosible mixture when suspended in air at standard atmospheric pressure and temperature would include ignition.

**Combustible Gas Detection System.**

A protection technique utilizing stationary gas detectors in industrial establishments. (CMP-14)

**Commissioning.**

The process, procedures, and testing used to set up and verify the initial performance, operational controls, safety systems, and sequence of operation of electrical devices and equipment, prior to it being placed into active service. (CMP-13)

**Communications Circuit.**

A metallic, fiber, or wireless circuit that provides voice/data (and associated power) for communications-related services between communications equipment. (CMP-16)

**Communications Circuit, Network-Powered Broadband. (Network-Powered Broadband Communications Circuit)**

The circuit extending from the communications utility's or service provider's serving terminal or tap up to and including the network interface unit (NIU). (830) (CMP-16)

Informational Note: A typical one-family dwelling network-powered communications circuit consists of a communications drop or communications service cable and an NIU and includes the communications utility's serving terminal or tap where it is not under the exclusive control of the communications utility.

**Communications Circuit, Premises. (Premises Communications Circuit)**

The circuit that extends voice, audio, video, data, interactive services, telegraph (except radio), and outside wiring for fire alarm and burglar alarm from the service provider's network terminal to the customer's communications equipment. (840) (CMP-16)

**Communications Equipment.**

The electronic equipment that performs the telecommunications operations for the transmission of audio, video, and data, and includes power equipment (e.g., dc converters, inverters, and batteries), technical support equipment (e.g., computers), and conductors dedicated solely to the operation of the equipment. (CMP-16)

Informational Note: As the telecommunications network transitions to a more data-centric network, computers, routers, servers, and their powering equipment, are becoming essential to the transmission of audio, video, and data and are finding increasing application in communications equipment installations.

**Communications Service Provider.**

An organization, business, or individual that offers communications service to others. (CMP-16)

**Community Antenna Television Circuit (CATV).**

The circuit that extends community antenna television systems for audio, video, data, and interactive services from the service provider's network terminal to the appropriate customer equipment. (CMP-16)

**Concealable Nonmetallic Extension.**

A listed assembly of two, three, or four insulated circuit conductors within a nonmetallic jacket, an extruded thermoplastic covering, or a sealed nonmetallic covering. The classification includes surface extensions intended for mounting directly on the surface of walls or ceilings and concealed with paint, texture, joint compound, plaster, wallpaper, tile, wall paneling, or other similar materials. (CMP-6)

**Concealed.**

Rendered inaccessible by the structure or finish of the building. (CMP-1)

Informational Note: Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.

**Concealed Knob-and-Tube Wiring.**

A wiring method using knobs, tubes, and flexible nonmetallic tubing for the protection and support of single insulated conductors. (CMP-6)

**Conductor, Bare. (Bare Conductor)**

A conductor having no covering or electrical insulation whatsoever. (CMP-6)



**Conductor, Copper-Clad Aluminum. (Copper-Clad Aluminum Conductor)**

Conductor drawn from a copper-clad aluminum rod, with the copper metallurgically bonded to an aluminum core. (CMP-6)

**Conductor, Covered. (Covered Conductor)**

A conductor encased within material of composition or thickness that is not recognized by this Code as electrical insulation. (CMP-6)

**Conductor, Insulated. (Insulated Conductor)**

A conductor encased within material of composition and thickness that is recognized by this Code as electrical insulation. (CMP-6)

**Conductor, Insulated. (Insulated Conductor)**

Overhead service conductor encased in a polymeric material adequate for the applied nominal voltage and any conductor types described in 310.4. (396) (CMP-6)

Informational Note: See ICEA S-76-474-2011, *Standard for Neutral Supported Power Cable Assemblies with Weather-Resistant Extruded Insulation Rated 600 Volts*, for information about overhead service conductors.

**Conductors, Outdoor Overhead. (Outdoor Overhead Conductors)**

Single conductors, insulated, covered, or bare, installed outdoors on support structures in free air. (395) (CMP-6)

**Conduit, Flexible Metal (FMC). (Flexible Metal Conduit)**

A raceway of circular cross section made of helically wound, formed, interlocked metal strip. (CMP-8)

**Conduit, High Density Polyethylene (HDPE). (High Density Polyethylene Conduit)**

A nonmetallic raceway of circular cross section, with associated couplings, connectors, and fittings for the installation of electrical conductors. (CMP-8)

**Conduit, Intermediate Metal (IMC). (Intermediate Metal Conduit)**

A steel 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. (CMP-8)

**Conduit, Liquidtight Flexible Metal (LFMC). (Liquidtight Flexible Metal Conduit)**

A raceway of circular cross section having an outer liquidtight, nonmetallic, sunlight-resistant jacket over an inner flexible metal core with associated couplings, connectors, and fittings for the installation of electric conductors. (CMP-8)

**Conduit, Liquidtight Flexible Nonmetallic (LFNC). (Liquidtight Flexible Nonmetallic Conduit)**

A raceway of circular cross section of various types as follows:

- (1) A smooth seamless inner core and cover bonded together and having one or more reinforcement layers between the core and covers, designated as LFNC-A
- (2) A smooth inner surface with integral reinforcement within the raceway wall, designated as LFNC-B
- (3) A corrugated internal and external surface without integral reinforcement within the raceway wall, designated as LFNC-C

(CMP-8)

Informational Note: FNMC is an alternative designation for LFNC.

**Conduit, Nonmetallic Underground with Conductors (NUCC). (Nonmetallic Underground Conduit with Conductors)**

A factory assembly of conductors or cables inside a nonmetallic, smooth wall raceway with a circular cross section. (CMP-8)

**Conduit, Reinforced Thermosetting Resin (RTRC). (Reinforced Thermosetting Resin Conduit)**

A rigid nonmetallic raceway of circular cross section, with integral or associated couplings, connectors, and fittings for the installation of electrical conductors and cables. (CMP-8)

**Conduit, Rigid Metal (RMC). (Rigid Metal Conduit)**

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. (CMP -8)

**Conduit, Rigid Polyvinyl Chloride (PVC). (Rigid Polyvinyl Chloride Conduit)**

A rigid nonmetallic raceway of circular cross section, with integral or associated couplings, connectors, and fittings for the installation of electrical conductors and cables. (CMP-8)

**Conduit Body.**

A separate portion of a conduit or tubing system that provides access through a removable cover(s) to the interior of the system at a junction of two or more sections of the system or at a terminal point of the system.

Boxes such as FS and FD or larger cast or sheet metal boxes are not classified as conduit bodies. (CMP-9)

**Connector.**

An electromechanical fitting. (393) (CMP-18)

**Connector, Intercell. (Intercell Connector)**

An electrically conductive bar or cable used to connect adjacent cells. (CMP-13)

**Connector, Intertier. (Intertier Connector)**

An electrical conductor used to connect two cells on different tiers of the same rack or different shelves of the same rack. (CMP-13)

**Connector, Load. (Load Connector)**

An electromechanical connector used for power from the busbar to utilization equipment. (393) (CMP-18)

**Connector, Pendant. (Pendant Connector)**

An electromechanical or mechanical connector used to suspend low-voltage luminaire or utilization equipment below the grid rail and to supply power to connect from the busbar to utilization equipment. (393) (CMP-18)

**Connector, Power Feed. (Power Feed Connector)**

An electromechanical connector used to connect the power supply to a power distribution cable, to connect directly to the busbar, or to connect from a power distribution cable to the busbar. (393) (CMP-18)

**Connector, Pressure (Solderless). (Pressure Connector)**

A device that establishes a connection between two or more conductors or between one or more conductors and a terminal by means of mechanical pressure and without the use of solder. (CMP-1)

**Connector, Rail to Rail. (Rail to Rail Connector)**

An electromechanical connector used to interconnect busbars from one ceiling grid rail to another grid rail. (393) (CMP-18)

**Connector Strip.**

A metal wireway containing pendant or flush receptacles. (520) (CMP-15)

**Container (as applied to batteries).**

A single-cell or multicell vessel or jar that holds the plates, electrolyte, and other elements of a single unit in a battery. (CMP-13)

**Continuous Load.**

A load where the maximum current is expected to continue for 3 hours or more. (CMP-2)

**Control.**

The predetermined process of connecting, disconnecting, increasing, or reducing electric power. (750) (CMP-13)

**Control Circuit.**

The circuit of a control apparatus or system that carries the electric signals directing the performance of the controller but does not carry the main power current. (CMP-11)

**Control Circuits, Fault-Tolerant External. (Fault-Tolerant External Control Circuits)**

Those control circuits either entering or leaving the fire pump controller enclosure, which if broken, disconnected, or shorted will not prevent the controller from starting the fire pump from all other internal or external means and may cause the controller to start the pump under these conditions. (695) (CMP-13)

**Control Device, Emergency Lighting. (Emergency Lighting Control Device)**

A separate or integral device intended to perform one or more emergency lighting control functions. (700) (CMP-13)

Informational Note: See UL 924, *Emergency Lighting and Power Equipment*, for information covering emergency lighting control devices.

**Control Drawing.**

A drawing or other document provided by the manufacturer of the intrinsically safe or associated apparatus, or of the nonincendive field wiring apparatus or associated nonincendive field wiring apparatus, that details the allowed interconnections between the intrinsically safe and associated apparatus or between the nonincendive field wiring apparatus or associated nonincendive field wiring apparatus. (CMP-14)

Informational Note: See the following standards for additional information:

- (1) ANSI/ISA/UL 120202, Recommendations for the Preparation, Content, and Organization of Intrinsic Safety Control Drawings
- (2) ANSI/UL 913, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
- (3) ANSI/UL 60079-11, Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”
- (4) ANSI/UL 121201, Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
- (5) ANSI/ISA RP 12.06.01, Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation — Part 1: Intrinsic Safety

**Control Room.**

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. (620) (CMP-12)

**Control Space.**

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, dumbwaiter, escalator, moving walk, or platform lift, but not the electrical driving machine or the hydraulic machine. (620) (CMP-12)

**Control System.**

The overall system governing the starting, stopping, direction of motion, acceleration, speed, and retardation of the moving member. (620) (CMP-12)

**Controller.**

A device or group of devices that serves to govern, in some predetermined manner, the electric power delivered to the apparatus to which it is connected. (CMP-1)

**Controller, Motion. (Motion Controller)**

The electrical device(s) for that part of the control system that governs the acceleration, speed, retardation, and stopping of the moving member. (620) (CMP-12)

Informational Note: The motor control function may be integral to the motion controller.

**Controller, Motor. (Motor Controller)**

Any switch or device that is normally used to start and stop a motor by making and breaking the motor circuit current. (CMP-11)

**Controller, Operation. (Operation Controller)**

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. (620) (CMP-12)

**Converter, DC-to-DC. (DC-to-DC Converter)**

A device that can provide an output dc voltage and current at a higher or lower value than the input dc voltage and current. (CMP-4)

**Converter Circuit, DC-to-DC. (DC-to-DC Converter Circuit)**

The dc circuit conductors connected to the output of a dc-to-dc converter. (CMP-4)

**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. (665) (CMP-12)

**Cooking Unit, Counter-Mounted. (Counter-Mounted Cooking Unit)**

A cooking appliance designed for mounting in or on a counter and consisting of one or more heating elements, internal wiring, and built-in or mountable controls. (CMP-2)

**Coordination, Selective. (Selective Coordination)**

Localization of an overcurrent condition to restrict outages to the circuit or equipment affected, accomplished by the selection and installation of overcurrent protective devices and their ratings or settings for the full range of available overcurrents, from overload to the available fault current, and for the full range of overcurrent protective device opening times associated with those overcurrents. (CMP-10)

**Cord, Flexible. (Flexible Cord)**

Two or more flexible insulated conductors enclosed in a flexible covering. (CMP-6)

**Cord Connector.**

A contact device terminated to a flexible cord that accepts an attachment plug or other insertion device. (CMP-6)

**Cord Connector [as applied to hazardous (classified) locations].**

A fitting intended to terminate a cord to a box or similar device and reduce the strain at points of termination and might include an explosionproof, a dust-ignitionproof, or a flameproof seal. (CMP-14)

**Cord Set.**

A length of flexible cord having an attachment plug at one end and a cord connector at the other end. (CMP-6)

**Corrosive Environment.**

Areas or enclosures without adequate ventilation, where electrical equipment is located and pool sanitation chemicals are stored, handled, or dispensed. (680) (CMP-17).

Informational Note No. 1: See *Advisory: Swimming Pool Chemical: Chlorine*, OSWER 90-008.1, June 1990, available from the EPA National Service Center for Environmental Publications (NSCEP) as sanitation chemicals and pool water are considered to pose a risk of corrosion (gradual damage or destruction of materials) due to the presence of oxidizers (e.g., calcium hypochlorite, sodium hypochlorite, bromine, chlorinated isocyanurates) and chlorinating agents that release chlorine when dissolved in water.

Informational Note No. 2: See ANSI/APSP-11, *Standard for Water Quality in Public Pools and Spas*, ANSI/ASHRAE 62.1, Table 6-4 Minimum Exhaust Rates, and *2021 International Swimming Pool and Spa Code (ISPSC)*, Section 324, including associated definitions and requirements concerning adequate ventilation of indoor spaces such as equipment and chemical storage rooms, which can reduce the likelihood of the accumulation of corrosive vapors. Chemicals such as chlorine cause severe corrosive and deteriorating effects on electrical connections, equipment, and enclosures when stored and kept in the same vicinity.

**Counter (Countertop).**

A fixed or stationary surface typically intended for food preparation and serving, personal lavation, or laundering or a similar surface that presents a routine risk of spillage of larger quantities of liquids upon outlets mounted directly on or in the surface. (CMP-2)

Informational Note No. 1: See UL 498, *Receptacles and Attachment Plugs*, and UL 943, *Ground-Fault Circuit Interrupters*, which establish the performance evaluation criteria and construction criteria.

Informational Note No. 2: See 406.5(E), 406.5(G)(1), and 406.5(H) for information on receptacles for counters and countertops distinguished from receptacles for work surfaces.

**Crane.**

A mechanical device used for lifting or moving boats. [ 303: 3.3.6] (555) (CMP-7)

**Critical Branch.**

A system of feeders and branch circuits supplying power for task illumination, fixed equipment, select receptacles, and select power circuits serving areas and functions related to patient care that are automatically connected to alternate power sources by one or more transfer switches during interruption of the normal power source. [ 99: 3.3.30] (517) (CMP-15)

**Critical Operations Areas, Designated (DCOA). (Designated Critical Operations Areas)**

Areas within a facility or site designated as requiring critical operations power. (CMP-13)

**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. (645) (CMP-12)

**Critical Operations Power Systems (COPS).**

Power systems for facilities or parts of facilities that require continuous operation for the reasons of public safety, emergency management, national security, or business continuity. (CMP-13)

**Cutout Box.**

An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure. (CMP-9)

**Data Center, Modular (MDC). (Modular Data Center)**

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. (646) (CMP-12)

Informational Note: 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.

**DC Plugging Box.**

A dc device consisting of one or more 2-pole, 2-wire, nonpolarized, non-grounding-type receptacles intended to be used on dc circuits only. (530) (CMP-15)

**Dead-Front.**

Without live parts exposed to a person on the operating side of the equipment. (CMP-9)

**Demand Factor.**

The ratio of the maximum demand of a system, or part of a system, to the total connected load of a system or the part of the system under consideration. (CMP-2)

**Dental Office.**

A building or part thereof in which the following occur:

- (1) Examinations and minor treatments/procedures performed under the continuous supervision of a dental professional;
- (2) Use of limited to minimal sedation and treatment or procedures that do not render the patient incapable of self-preservation under emergency conditions; and
- (3) No overnight stays for patients or 24-hour operations.

[ 99: 3.3.38] (CMP-15)

**Device.**

A unit of an electrical system, other than a conductor, that carries or controls electric energy as its principal function. (CMP-1)

**Dielectric Heating.**

Heating of a nominally insulating material due to its own dielectric losses when the material is placed in a varying electric field. (665) (CMP-12)

**Disconnecting Means.**

A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply. (CMP-1)



**Distribution Point (Center Yard Pole) (Meter Pole).**

An electrical supply point from which service drops, service conductors, feeders, or branch circuits to buildings or structures utilized under single management are supplied. (547) (CMP-7)

Informational Note: The service point is typically located at the distribution point.

**Diversion Controller (Diversion Charge Controller) (Diversion Load Controller).**

Equipment that regulates the output of a source or charging process by diverting power to direct-current or alternating-current loads or to an interconnected utility service. (CMP-13)

**Diversion Load.**

A load connected to a diversion charge controller or diversion load controller, also known as a dump load. (CMP-4)

**Docking Facility.**

A covered or open, fixed or floating structure that provides access to the water and to which boats are secured. [ 303: 3.3.7] (555) (CMP-7)

**Dormitory Unit.**

A building or a space in a building in which group sleeping accommodations are provided for more than 16 persons who are not members of the same family in one room, or a series of closely associated rooms, under joint occupancy and single management, with or without meals, but without individual cooking facilities. (CMP 2)

**Drop Box.**

A box containing pendant- or flush-mounted receptacles attached to a multiconductor cable via strain relief or a multipole connector. (520) (CMP-15)

**Dust-Ignitionproof.**

Equipment enclosed in a manner that excludes dusts and does not permit arcs, sparks, or heat otherwise generated or liberated inside of the enclosure to cause ignition of exterior accumulations or atmospheric suspensions of a specified dust on or in the vicinity of the enclosure. (CMP-14)

Informational Note No. 1: See ANSI/UL 1203, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations*, for additional information on dust-ignitionproof enclosures.

Informational Note No. 2: See NEMA 250, *Enclosures for Electrical Equipment (1000 Volts Maximum)*, for additional information on dust-ignitionproof enclosures that are sometimes marked additionally marked Type 9.

**Dusttight.**

Enclosures constructed so that dust will not enter under specified test conditions. (CMP-14)

Informational Note No. 1: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

Informational Note No. 2: See NEMA 250, *Enclosures for Electrical Equipment (1000 Volts Maximum)*, and ANSI/UL 50E, *Enclosures for Electrical Equipment, Environmental Considerations*, for additional information on enclosure Types 3, 3X, 3S, 3SX, 4, 4X, 5, 6, 6P, 12, 12K, and 13 that are considered dusttight.

**Duty, Continuous. (Continuous Duty)**

Operation at a substantially constant load for an indefinitely long time. (CMP-1)

**Duty, Intermittent. (Intermittent Duty)**

Operation for alternate intervals of (1) load and no load; or (2) load and rest; or (3) load, no load, and rest. (CMP-1)

**Duty, Periodic. (Periodic Duty)**

Intermittent operation in which the load conditions are regularly recurrent. (CMP-1)

**Duty, Short-Time. (Short-Time Duty)**

Operation at a substantially constant load for a short and definite, specified time. (CMP-1)

**Duty, Varying. (Varying Duty)**

Operation at loads, and for intervals of time, both of which may be subject to wide variation. (CMP-1)

**Dwelling, One-Family. (One-Family Dwelling)**

A building that consists solely of one dwelling unit. (CMP-1)

**Dwelling, Two-Family. (Two-Family Dwelling)**

A building that consists solely of two dwelling units. (CMP-1)

**Dwelling, Multifamily. (Multifamily Dwelling)**

A building that contains three or more dwelling units. (CMP-1)

**Dwelling Unit.**

A single unit, providing complete and independent living facilities for one or more persons, including permanent provisions for living, sleeping, cooking, and sanitation. (CMP-2)

**Electric-Discharge Lighting.**

Systems of illumination utilizing fluorescent lamps, high-intensity discharge (HID) lamps, or neon tubing. (CMP-18)

**Electric Power Production and Distribution Network.**

Power production, distribution, and utilization equipment and facilities, such as electric utility systems that are connected to premises wiring and are external to and not controlled by a system that operates in interactive mode. (CMP-13)

**Electric Sign.**

A fixed, stationary, or portable self-contained, electrically operated and/or electrically illuminated utilization equipment with words or symbols designed to convey information or attract attention. (CMP-18)

**Electric Supply Stations.**

Locations containing the generating stations and substations, including their associated generator, storage battery, transformer, and switchgear areas. (CMP-4)

**Electric Vehicle (EV).**

An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and electric motorcycles, 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 electric vehicles having a second source of motive power. (CMP-12)

Informational Note: Off-road, self-propelled electric mobile machines, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, and boats are not considered electric vehicles.

**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. (625) (CMP-12)

Informational Note: See 625.48 for further information on interactive systems.



**Electric Vehicle Power Export Equipment (EVPE).**

The equipment, including the outlet on the vehicle, that is used to provide electrical power at voltages greater than or equal to 30 Vac or 60 Vdc to loads external to the vehicle, using the vehicle as the source of supply. (625) (CMP-12)

Informational Note: Electric vehicle power export equipment and electric vehicle supply equipment or wireless power transfer equipment are sometimes contained in one piece of equipment, sometimes referred to as a bidirectional electric vehicle supply equipment (EVSE) or bidirectional wireless power transfer equipment (WPTE).

**Electric Vehicle Supply Equipment (EVSE).**

Equipment for plug-in charging, 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. (625) (CMP-12)

Informational Note: Electric vehicle power export equipment and electric vehicle supply equipment or wireless power transfer equipment (WPTE) are sometimes contained in one piece of equipment, sometimes referred to as a bidirectional EVSE or bidirectional WPTE.

**Electrical Circuit Protective System.**

A system consisting of components and materials intended for installation as protection for specific electrical wiring systems with respect to the disruption of electrical circuit integrity upon exterior fire exposure. (CMP-16)

**Electrical Datum Plane.**

A specified vertical distance above the normal high-water level at which electrical equipment can be installed and electrical connections can be made. (CMP-7)

**Electrical Ducts.**

Electrical conduits, or other raceways round in cross section, that are suitable for use underground or embedded in concrete. (CMP-6)

**Electrical Life Support Equipment.**

Electrically powered equipment whose continuous operation is necessary to maintain a patient's life. [ 99 :3.3.45] (517) (CMP-15)

**Electrical Resistance Trace Heating "60079-30-1".**

Type of protection for the purpose of producing heat on the principle of electrical resistance and typically composed of one or more metallic conductors and/or an electrically conductive material, suitably electrically insulated and protected. (CMP-14)

Informational Note: See ANSI/UL 60079-30-1, *Explosive Atmospheres — Part 30-1: Electrical Resistance Trace Heating — General and Testing Requirements*, for additional information.

**Electrically Connected.**

A connection capable of carrying current as distinguished from connection through electromagnetic induction. (668) (CMP-12)

### **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. (626) (CMP-12)

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. (626) (CMP-12)

### **Electrolyte.**

The medium that provides the ion transport mechanism between the positive and negative electrodes of a cell. (CMP-13)

### **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. (668) (CMP-12)

### **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. (668) (CMP-12)

### **Electronic Power Converter.**

A device that uses power electronics to convert one form of electrical power into another form of electrical power. (CMP-4)

Informational Note: Examples of electronic power converters include, but are not limited to, inverters, dc-to-dc converters, and electronic charge controllers. These devices have limited current capabilities based on the device ratings at continuous rated power.

### **Electronically Protected.**

A motor provided with electronic control that is an integral part of the motor and protects the motor against dangerous overheating due to failure of the electronic control, overload, and failure to start. (430) (CMP-11)

### **Emergency Luminaire, Battery-Equipped. (Battery-Equipped Emergency Luminaire)**

A luminaire with a rechargeable battery, a battery charging means, and an automatic load control relay. (CMP-13)

### **Emergency Luminaire, Directly Controlled. (Directly Controlled Emergency Luminaire)**

A luminaire supplied by the facility emergency power system and with a control input for dimming or switching that provides an emergency illumination level upon loss of normal power. (700) (CMP-13)

Informational Note: See ANSI/UL 924, *Emergency Lighting and Power Equipment*, for information covering directly controlled emergency luminaires.

### **Emergency Power Supply (EPS).**

The source(s) of electric power of the required capacity and quality for an emergency power supply system (EPSS). (CMP-13)

**Emergency Power Supply System (EPSS).**

A complete functioning EPS system coupled to a system of conductors, disconnecting means and overcurrent protective devices, transfer switches, and all control, supervisory, and support devices up to and including the load terminals of the transfer equipment needed for the system to operate as a safe and reliable source of electric power. [ 110: 3.3.4] (CMP-13)

**Emergency Systems.**

Those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction. These systems are intended to automatically supply illumination, power, or both, to designated areas and equipment in the event of failure of the normal supply or in the event of accident to elements of a system intended to supply, distribute, and control power and illumination essential for safety to human life. (CMP-13)

**Encapsulation “m”.**

Type of protection where electrical parts that could ignite an explosive atmosphere by either sparking or heating are enclosed in a compound in such a way that this explosive atmosphere cannot be ignited. (CMP-14)

Informational Note: See ANSI/UL 60079-18, *Explosive atmospheres — Part 18: Equipment protection by encapsulation “m”*, for additional information.

**Enclosed.**

Surrounded by a case, housing, fence, or wall(s) that prevents persons from accidentally contacting energized parts. (CMP-1)

**Enclosed-Break.**

Having electrical make-or-break contacts such that, if an internal explosion of the flammable gas or vapor that can enter it occurs, the device will withstand the internal explosion without suffering damage and without communicating the internal explosion to the external flammable gas or vapor.(CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Enclosure.**

The case or housing of apparatus, or the fence or walls surrounding an installation to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. (CMP-1)

Informational Note: See Table 110.28 for examples of enclosure types.

**Energized.**

Electrically connected to, or is, a source of voltage. (CMP-1)

**Energized, Likely to Become. (Likely to Become Energized)**

Conductive material that could become energized because of the failure of electrical insulation or electrical spacing. (CMP-5)

**Energy Management System (EMS).**

A system consisting of any of the following: a monitor(s), communications equipment, a controller(s), a timer(s), or other device(s) that monitors and/or controls an electrical load or a power production or storage source. (CMP-13)

**Energy Storage System (ESS).**

One or more devices installed as a system capable of storing energy and providing electrical energy into the premises wiring system or an electric power production and distribution network. (CMP-13)

Informational Note No. 1: An ESS(s) can include but is not limited to batteries, capacitors, and kinetic energy devices (e.g., flywheels and compressed air). An ESS(s) can include inverters or converters to change voltage levels or to make a change between an ac or a dc system.

Informational Note No. 2: These systems differ from a stationary standby battery installation where a battery spends the majority of the time on continuous float charge or in a high state of charge, in readiness for a discharge event.

**Entertainment Device.**

A mechanical or electromechanical device that provides an entertainment experience. (522) (CMP-15)

Informational Note: These devices can include animated props, show action equipment, animated figures, and special effects, coordinated with audio and lighting to provide an entertainment experience.

**Equipment.**

A general term, including fittings, devices, appliances, luminaires, apparatus, machinery, and the like used as a part of, or in connection with, an electrical installation. (CMP-1)

**Equipment, Mobile. (Mobile Equipment)**

Equipment with electrical components that is suitable to be moved only with mechanical aids or is provided with wheels for movement by a person(s) or powered devices. (513) (CMP-14)

**Equipment, Portable. (Portable Equipment)**

Equipment fed with portable cords or cables intended to be moved from one place to another. (640) (CMP-12)

**Equipment, Portable. (Portable Equipment)**

Equipment with electrical components suitable to be moved by a single person without mechanical aids. (511) (CMP-14)

**Equipment, Portable. (Portable Equipment)**

Equipment fed with portable cords or cables intended to be moved from one place to another. (520) (CMP-15)

**Equipment, Portable. (Portable Equipment)**

Equipment intended to be moved from one place to another. (530) (CMP-15)

**Equipment, Signal. (Signal Equipment)**

Includes audible and visual equipment such as chimes, gongs, lights, and displays that convey information to the user. (620) (CMP-12)

**Equipment Branch.**

A system of feeders and branch circuits arranged for delayed, automatic, or manual connection to the alternate power source and that serves primarily 3-phase power equipment. [ 99 :3.3.50] (517) (CMP-15)

**Equipment Leakage Current Interrupter (ELCI)**

A residual current device (RCD) which detects equipment ground fault leakage current and disconnects all current carrying conductors from the supply source at a preset trip threshold.

**Equipment Protection Level (EPL).**

Level of protection assigned to equipment based on its likelihood of becoming a source of ignition, and distinguishing the differences between explosive gas atmospheres and explosive dust atmospheres. (CMP-14)

Informational Note: See ANSI/UL 60079-0, *Explosive Atmospheres — Part 0: Equipment — General Requirements*, for additional information.

**Equipment Rack.**

A framework for the support, enclosure, or both, of equipment; can be portable or stationary. (640) (CMP-12)

Informational Note: See EIA/ECA 310-E-2005, *Cabinets, Racks, Panels and Associated Equipment*, for examples of equipment racks.

**Equipotential Plane.**

Conductive parts bonded together to reduce voltage gradients in a designated area. (682) (CMP-17)

**Equipotential Plane.**

Conductive elements that are connected together to minimize voltage differences. (CMP-7)

**Essential Electrical System.**

A system comprised of alternate power sources and all connected distribution systems and ancillary equipment, designed to ensure continuity of electrical power to designated areas and functions of a health care facility during disruption of normal power sources, and also to minimize disruption within the internal wiring system. [ 99 :3.3.52] (517) (CMP-15)

**Explosionproof Equipment.**

Equipment enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that might occur within it, that is capable of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within, and that operates at such an external temperature that a surrounding flammable atmosphere will not be ignited. (CMP-14)

Informational Note No. 1: See ANSI/UL 1203, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations*, for additional information.

Informational Note No. 2: See NEMA 250, *Enclosures for Electrical Equipment (1000 Volts Maximum)*, for additional information on explosionproof enclosures that are sometimes additionally marked Type 7.

**Exposed (as applied to live parts).**

Capable of being inadvertently touched or approached nearer than a safe distance by a person. (CMP-1)

Informational Note: This term applies to parts that are not suitably guarded, isolated, or insulated.

**Exposed (as applied to wiring methods).**

On or attached to the surface or behind panels designed to allow access. (CMP-1)

**Exposed (Optical Fiber Cable Exposed to Accidental Contact).**

A conductive optical fiber cable in such a position that, in case of failure of supports or insulation, contact between the cable's non-current-carrying conductive members and an electrical circuit might result. (CMP-16)

**Exposed (to Accidental Contact).**

A circuit in such a position that, in case of failure of supports or insulation, contact with another circuit may result. (CMP-16)

**Exposed Conductive Surfaces.**

Those surfaces that are capable of carrying electric current and that are unprotected, uninsulated, unenclosed, or unguarded, permitting personal contact. [ 99: 3.3.54] (517) (CMP-15)

Informational Note: Paint, anodizing, and similar coatings are not considered suitable insulation, unless they are listed for such use.

**Externally Operable.**

Capable of being operated without exposing the operator to contact with live parts. (CMP-1)

**Facility, On-Site Power Production. (On-Site Power Production Facility)**

The normal supply of electric power for the site that is expected to be constantly producing power. (695) (CMP-13)

**Fastened-in-Place.**

Mounting means of equipment in which the fastening means are specifically designed to permit removal without the use of a tool. (625) (CMP-12)

**Fault-Managed Power (FMP).**

A powering system that monitors for faults and controls current delivered to ensure fault energy is limited. (726) (CMP-3)

Informational Note No. 1: The monitoring and control systems differentiate fault-managed power from electric light and power circuits; therefore, alternative requirements to those of Chapters 1 through 4 are given regarding minimum wire sizes, ampacity adjustment and correction factors, overcurrent protection, insulation requirements, and wiring methods and materials.

Informational Note No. 2: A fault-managed power circuit is also commonly referred to as a Class 4 circuit.

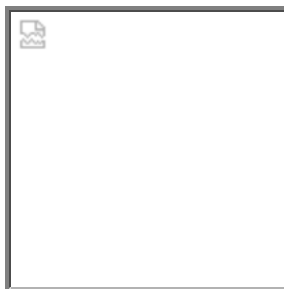
**Fault Current.**

The current delivered at a point on the system during a short-circuit condition. (CMP-10)

**Fault Current, Available. (Available Fault Current)**

The largest amount of current capable of being delivered at a point on the system during a short-circuit condition. (CMP-10)

Informational Note: A short-circuit can occur during abnormal conditions such as a fault between circuit conductors or a ground fault. See Informational Note Figure 100.1 .

**Figure Informational Note Figure 100.1 Available Fault Current.**



**Fault Protection Device.**

An electronic device that is intended for the protection of personnel and functions under fault conditions, such as network-powered broadband communications cable short or open circuit, to limit the current or voltage, or both, for a low-power network-powered broadband communications circuit and provide acceptable protection from electric shock. (830) (CMP-16)

**Feeder.**

All circuit conductors between the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent device. (CMP-10)

**Feeder Assembly.**

The overhead or under-chassis feeder conductors, including the equipment grounding conductor, together with the necessary fittings and equipment; or the power-supply cord assembly for a mobile home, recreational vehicle, or park trailer, identified for the delivery of energy from the source of electrical supply to the panelboard within the mobile home, recreational vehicle, or park trailer. (CMP-7)

**Festoon Lighting.**

A string of outdoor lights that is suspended between two points. (CMP-18)

**Fibers/Flyings, Combustible. (Combustible Fibers/Flyings)**

Fibers/flyings, where any dimension is greater than 500  $\mu\text{m}$  in nominal size, which can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature. [ 499: 3.3.4.1] (CMP-14)

Informational Note No. 1: This definition and Informational Notes No. 2 and No. 3 have been extracted from NFPA 499-2021, *Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*. The NFPA 499 reference is in brackets. Only editorial changes were made to the extracted text to make it consistent with this Code.

Informational Note No. 2: Section 500.5(D) defines a Class III location. Combustible fibers/flyings can be similar in physical form to ignitable fibers/flyings and protected using the same electrical equipment installation methods. Examples of fibers/flyings include flat platelet-shaped particulate, such as metal flake, and fibrous particulate, such as particle board core material. If the smallest dimension of a combustible material is greater than 500  $\mu\text{m}$ , it is unlikely that the material would be combustible fibers/flyings, as determined by test. Finely divided solids with lengths that are large compared to their diameter or thickness usually do not pass through a 500  $\mu\text{m}$  sieve, yet when tested could potentially be determined to be explosible. [ 499: A.3.3.4.1]

Informational Note No. 3: See ASTM E1226, *Standard Test Method for Explosibility of Dust Clouds*, ISO 6184-1, *Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air*, or ISO/IEC/UL 80079-20-2, *Explosive atmospheres — Part 20-2: Material characteristics — Combustible dusts test methods*, for procedures for determining the explosibility of dusts. A material that is found to not present an explosible mixture could still be an ignitable fiber/flying, as defined in this article. Historically, the explosibility condition has been described as presenting a flash fire or explosion hazard. It could be understood that the potential hazard due to the formation of an explosible mixture when suspended in air at standard atmospheric pressure and temperature would include ignition. [ 499: A.3.3.4.1]

**Fibers/Flyings, Ignitable. (Ignitable Fibers/Flyings)**

Fibers/flyings where any dimension is greater than 500 µm in nominal size, which are not likely to be in suspension in quantities to produce an explosible mixture, but could produce an ignitable layer fire hazard. [ **499**: 3.3.4.2] (CMP-14)

Informational Note No. 1: This definition and Informational Note No. 2 have been extracted from NFPA 499-2021, *Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*. The NFPA 499 reference is in brackets. Only editorial changes were made to the extracted text to make it consistent with this *Code*.

Informational Note No. 2: Section 500.5 of this *Code* prescribes a Class III location as one where ignitable fibers/flyings are present, but not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures. This description addresses fibers/flyings that do not present a flash-fire hazard or explosion hazard by test. This could be because those fibers/flyings are too large or too agglomerated to be suspended in air in sufficient concentration, or at all, under typical test conditions. Alternatively, this could be because they burn so slowly that, when suspended in air, they do not propagate combustion at any concentration. In this document the zone classification system includes ignitable fibers/flyings as a fire hazard in a layer, which is not addressed in the IEC zone system (see IEC 60079-10-2, *Explosive atmospheres — Part 10-2: Classification of areas — Explosive dust atmospheres*). Where these are present, the user could also consider installation in accordance with Article 503 of this *Code*. [ **499**: A.3.3.4.2]

**Field Evaluation Body (FEB).**

An organization or part of an organization that performs field evaluations of electrical or other equipment. [ **790**: 3.3.4] (CMP-1)

Informational Note: See NFPA 790-2021, *Standard for Competency of Third-Party Field Evaluation Bodies*, provides guidelines for establishing the qualification and competency of a body performing field evaluations of electrical products and assemblies with electrical components.

**Field Labeled (as applied to evaluated products).**

Equipment or materials to which has been attached a label, symbol, or other identifying mark of an FEB indicating the equipment or materials were evaluated and found to comply with requirements as described in an accompanying field evaluation report. [ **790**: 3.3.6] (CMP-1)

**Fire Alarm Circuit.**

The portion of the wiring system between the load side of the overcurrent device or the power-limited supply and the connected equipment of all circuits powered and controlled by the fire alarm system. Fire alarm circuits are classified as either non-power-limited or power-limited. (CMP-3)

**Fire Alarm Circuit, Non-Power-Limited (NPLFA). (Non-Power-Limited Fire Alarm Circuit)**

A fire alarm circuit powered by a source that is not power limited. (CMP-3)

Informational Note: See 760.41 and 760.43 for requirements for non-power-limited fire alarm circuits.

**Fire Alarm Circuit, Power-Limited (PLFA). (Power-Limited Fire Alarm Circuit)**

A fire alarm circuit powered by a power-limited source. (CMP-3)

Informational Note: See 760.121 for requirements on power-limited fire alarm circuits.

**Fitting.**

An accessory such as a locknut, bushing, or other part of a wiring system that is intended primarily to perform a mechanical rather than an electrical function. (CMP-1)

**Fixed (as applied to equipment).**

Equipment that is fastened or otherwise secured at a specific location. (680) (CMP-17)



**Fixed-in-Place.**

Mounting means of equipment using fasteners that require a tool for removal. (625) (CMP-12)

**Flameproof “d”.**

Type of protection where the enclosure will withstand an internal explosion of a flammable mixture that has penetrated into the interior, without suffering damage and without causing ignition, through any joints or structural openings in the enclosure of an external explosive gas atmosphere consisting of one or more of the gases or vapors for which it is designed. (CMP-14)

Informational Note: See ANSI/UL 60079-1, *Explosive Atmospheres — Part 1: Equipment Protection by Flameproof Enclosures “d”*, for additional information.

**Flammable Anesthetics.**

Gases or vapors, such as fluroxene, cyclopropane, divinyl ether, ethyl chloride, ethyl ether, and ethylene, that could form flammable or explosive mixtures with air, oxygen, or reducing gases such as nitrous oxide. (517) (CMP-15)

**Flexible Bus Systems.**

An assembly of flexible insulated bus, with a system of associated fittings used to secure, support, and terminate the bus. (CMP-8)

Informational Note: Flexible bus systems are engineered systems for a specific site location and are ordinarily assembled at the point of installation from the components furnished or specified by the manufacturer.

**Flexible Insulated Bus.**

A flexible rectangular conductor with an overall insulation. (CMP-8)

**Flywheel ESS (FESS).**

A mechanical ESS composed of a spinning mass referred to as a rotor and an energy conversion mechanism such as a motor-generator that converts the mechanical energy to electrical energy. (706) (CMP-13)

Informational Note: There are primarily two types of rotor constructions, solid metal mass design and composite fiber design.

**Footlight.**

A border light installed on or in the stage. (520) (CMP-15)

**Forming Shell.**

A structure designed to support a wet-niche luminaire assembly and intended for mounting in a pool or fountain structure. (680) (CMP-17)

**Fountain.**

An ornamental structure or recreational water feature from which one or more jets or streams of water are discharged into the air, including splash pads, ornamental pools, display pools, and reflection pools. The definition does not include drinking water fountains or water coolers. (680) (CMP-17)

**Frame.**

Chassis rail and any welded addition thereto of metal thickness of 1.35 mm (0.053 in.) or greater. (551) (CMP-7)

**Free Air (as applied to conductors).**

Open or ventilated environment that allows for heat dissipation and air flow around an installed conductor. (CMP-6)

**Fuel Cell.**

An electrochemical system that consumes fuel to produce an electric current. In such cells, the main chemical reaction used for producing electric power is not combustion. However, there may be sources of combustion used within the overall cell system, such as reformers/fuel processors. (CMP-4)

**Fuel Cell System.**

The complete aggregate of equipment used to convert chemical fuel into usable electricity and typically consisting of a reformer, stack, power inverter, and auxiliary equipment. (CMP-4)

**Fuse.**

An overcurrent protective device with a circuit-opening fusible part that is heated and severed by the passage of overcurrent through it. (CMP-10)

Informational Note: A fuse comprises all the parts that form a unit capable of performing the prescribed functions. It may or may not be the complete device necessary to connect it into an electrical circuit.

**Fuse, Electronically Actuated. (Electronically Actuated Fuse)**

An overcurrent protective device that generally consists of a control module that provides current-sensing, electronically derived time-current characteristics, energy to initiate tripping, and an interrupting module that interrupts current when an overcurrent occurs. Such fuses may or may not operate in a current-limiting fashion, depending on the type of control selected. (CMP-10)

**Fuse, Expulsion. (Expulsion Fuse)**

A vented fuse unit in which the expulsion effect of gases produced by the arc and lining of the fuseholder, either alone or aided by a spring, extinguishes the arc. (CMP-10)

**Fuse, Nonvented Power. (Nonvented Power Fuse)**

A fuse without intentional provision for the escape of arc gases, liquids, or solid particles to the atmosphere during circuit interruption. (CMP-10)

**Fuse, Power. (Power Fuse)**

A vented, nonvented, or controlled vented fuse unit in which the arc is extinguished by being drawn through solid material, granular material, or liquid, either alone or aided by a spring. (CMP-10)

**Fuse, Vented Power. (Vented Power Fuse)**

A fuse with provision for the escape of arc gases, liquids, or solid particles to the surrounding atmosphere during circuit interruption. (CMP-10)

**Garage.**

A building or portion of a building in which one or more self-propelled vehicles can be kept for use, sale, storage, rental, repair, exhibition, or demonstration purposes. (CMP-1)

Informational Note: See 511.1 for commercial garages, repair and storage.

**Garage, Major Repair. (Major Repair Garage)**

A building or portions of a building where major repairs, such as engine overhauls, painting, body and fender work, welding or grinding, and repairs that require draining or emptying of the motor vehicle fuel tank are performed on motor vehicles, including associated floor space used for offices, parking, or showrooms. [ **30A:** 3.3.12.1] (CMP-14)

**Garage, Minor Repair. (Minor Repair Garage)**

A building or portions of a building used for lubrication, inspection, and minor automotive maintenance work, such as engine tune-ups, replacement of parts, fluid changes (e.g., oil, antifreeze, transmission fluid, brake fluid, air-conditioning refrigerants), brake system repairs, tire rotation, and similar routine maintenance work, including the associated floor space used for offices, parking, or showrooms. [ **30A:** 3.3.12.2] (CMP-14)

**General-Purpose Cables, Cable Routing Assemblies, and Raceways.**

Cables, cable routing assemblies, and raceways are suitable for general-purpose applications and are resistant to the spread of fire. (722) (CMP-3)

**Generating Capacity, Inverter. (Inverter Generating Capacity)**

The sum of parallel-connected inverter maximum continuous output power at 40°C in watts, kilowatts, volt-amperes, or kilovolt-amperes. (CMP-4)

**Generating Station.**

A plant wherein electric energy is produced by conversion from some other form of energy (e.g., chemical, nuclear, solar, wind, mechanical, or hydraulic) by means of suitable apparatus. (CMP-4)

**Generator (Generator Set).**

A machine that converts mechanical energy into electrical energy by means of a prime mover and alternator and/or inverter. (CMP-13)

**Generator, On-Site Standby. (On-Site Standby Generator)**

A facility producing electric power on site as the alternate supply of electric power. It differs from an on-site power production facility in that it is not constantly producing power. (695) (CMP-13)

**Grid Bus Rail.**

A combination of the busbar, the busbar support, and the structural suspended ceiling grid system. (393) (CMP-18)

**Ground.**

The earth. (CMP-5)

**Ground Fault.**

An unintentional, electrically conductive connection between an ungrounded conductor of an electrical circuit and the normally non-current-carrying conductors, metal enclosures, metal raceways, metal equipment, or earth. (CMP-5)

**Ground-Fault Circuit Interrupter (GFCI).**

A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a ground-fault current exceeds the values established for a Class A device. (CMP-2)

Informational Note: See UL 943, *Standard for Ground-Fault Circuit Interrupters*, for further information. Class A ground-fault circuit interrupters trip when the ground-fault current is 6 mA or higher and do not trip when the ground-fault current is less than 4 mA.

**Ground-Fault Circuit Interrupter, Special Purpose (SPGFCI). (Special Purpose Ground-Fault Circuit Interrupter)**

A device intended for the detection of ground-fault currents, used in circuits with voltage to ground greater than 150 volts, that functions to de-energize a circuit or portion of a circuit within an established period of time when a ground-fault current exceeds the values established for Class C, D, or E devices. (CMP-2)

Informational Note: See UL 943C, *Outline of Investigation for Special Purpose Ground-Fault Circuit Interrupters*, for information on Classes C, D, or E special purpose ground-fault circuit interrupters.

**Ground-Fault Current Path.**

An electrically conductive path from the point of a ground fault on a wiring system through normally non-current-carrying conductors, grounded conductors, equipment, or the earth to the electrical supply source. (CMP-5)

Informational Note: Examples of ground-fault current paths are any combination of equipment grounding conductors, metallic raceways, metallic cable sheaths, electrical equipment, and any other electrically conductive material such as metal, water, and gas piping; steel framing members; stucco mesh; metal ducting; reinforcing steel; shields of communications cables; grounded conductors; and the earth itself.

**Ground-Fault Current Path, Effective. (Effective Ground-Fault Current Path)**

An intentionally constructed, low-impedance electrically conductive path designed and intended to carry current during ground-fault events from the point of a ground fault on a wiring system to the electrical supply source and that facilitates the operation of the overcurrent protective device or ground-fault detectors. (CMP-5)

**Ground-Fault Detector-Interrupter, dc (GFDI).**

A device that provides protection for PV system dc circuits by detecting a ground fault and could interrupt the fault path in the dc circuit. (690) (CMP-4)

Informational Note: See UL 1741, *Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources*, and UL 62109, *Standard for Power Converters for use in Photovoltaic Power Systems*, for further information on GFDI equipment.

**Ground-Fault Protection of Equipment (GFPE).**

A system intended to provide protection of equipment from damaging line-to-ground fault currents by operating to cause a disconnecting means to open all ungrounded conductors of the faulted circuit. This protection is provided at current levels less than those required to protect conductors from damage through the operation of a supply circuit overcurrent device. (CMP-5)

**Grounded (Grounding).**

Connected (connecting) to ground or to a conductive body that extends the ground connection. (CMP-5)

**Grounded, Functionally. (Functionally Grounded)**

A system that has an electrical ground reference for operational purposes that is not solidly grounded. (CMP-4)

Informational Note: A functionally grounded system is often connected to ground through an electronic means internal to an inverter or charge controller that provides ground-fault protection. Examples of operational purposes for functionally grounded systems include ground-fault detection and performance-related issues for some power sources.

**Grounded, Solidly. (Solidly Grounded)**

Connected to ground without inserting any resistor or impedance device. (CMP-5)

**Grounded Conductor.**

A system or circuit conductor that is intentionally grounded. (CMP-5)

Informational Note: Although an equipment grounding conductor is grounded, it is not considered a grounded conductor.

**Grounded System, Impedance. (Impedance Grounded System)**

An electrical system that is grounded by intentionally connecting the system neutral point to ground through an impedance device. (CMP-5)

**Grounding Conductor, Equipment (EGC). (Equipment Grounding Conductor)**

A conductive path(s) that is part of an effective ground-fault current path and connects normally non-current-carrying metal parts of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both. (CMP-5)

Informational Note No. 1: It is recognized that the equipment grounding conductor also performs bonding.

Informational Note No. 2: See 250.118 for a list of acceptable equipment grounding conductors.

**Grounding Conductor, Impedance. (Impedance Grounding Conductor)**

A conductor that connects the system neutral point to the impedance device in an impedance grounded system. (CMP-5)

**Grounding Electrode.**

A conducting object through which a direct connection to earth is established. (CMP-5)

**Grounding Electrode Conductor (GEC).**

A conductor used to connect the system grounded conductor or the equipment to a grounding electrode or to a point on the grounding electrode system. (CMP-5)

**Grouped.**

Cables or conductors positioned adjacent to one another but not in continuous contact with each other. (520) (CMP-15)

**Guarded.**

Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats, or platforms to remove the likelihood of approach or contact by persons or objects to a point of danger. (CMP-1)

**Guest Room.**

An accommodation combining living, sleeping, sanitary, and storage facilities within a compartment. (CMP-2)

**Guest Suite.**

An accommodation with two or more contiguous rooms comprising a compartment, with or without doors between such rooms, that provides living, sleeping, sanitary, and storage facilities. (CMP-2)

**Gutter, Metal Auxiliary. (Metal Auxiliary Gutter)**

A sheet metal enclosure used to supplement wiring spaces at meter centers, distribution centers, switchgear, switchboards, and similar points of wiring systems. The enclosure has hinged or removable covers for housing and protecting electrical wires, cable, and busbars. The enclosure is designed for conductors to be laid or set in place after the enclosures have been installed as a complete system. (CMP-8)

**Gutter, Nonmetallic Auxiliary. (Nonmetallic Auxiliary Gutter)**

A flame-retardant, nonmetallic enclosure used to supplement wiring spaces at meter centers, distribution centers, switchgear, switchboards, and similar points of wiring systems. The enclosure has hinged or removable covers for housing and protecting electrical wires, cable, and busbars. The enclosure is designed for conductors to be laid or set in place after the enclosures have been installed as a complete system. (CMP-8)

**Habitable Room.**

A room in a building for living, sleeping, eating, or cooking, but excluding bathrooms, toilet rooms, closets, hallways, storage or utility spaces, and similar areas. (CMP-2)

**Handhole Enclosure.**

An enclosure for use in underground systems, provided with an open or closed bottom, and sized to allow personnel to reach into, but not enter, for the purpose of installing, operating, or maintaining equipment or wiring or both. (CMP-9)

**Hazard Current.**

For a given set of connections in an isolated power system, the total current that would flow through a low impedance if it were connected between either isolated conductor and ground. [99:3.3.72] (517) (CMP-15)

**Hazard Current, Fault. (Fault Hazard Current)**

The hazard current of a given isolated power system with all devices connected except the line isolation monitor. [ 99: 3.3.72.1] (517) (CMP-15)

**Monitor Hazard Current.**

The hazard current of the line isolation monitor alone. [ 99: 3.3.72.2] (517) (CMP-15)

**Total Hazard Current.**

The hazard current of a given isolated system with all devices, including the line isolation monitor, connected. [ 99: 3.3.72.3] (517) (CMP-15)

**Header.**

Transverse metal raceways for electrical conductors, providing access to predetermined cells of a precast cellular concrete floor, thereby permitting the installation of electrical conductors from a distribution center to the floor cells. (CMP-8)

**Health Care Facilities.**

Buildings, portions of buildings, or mobile enclosures in which human medical, dental, psychiatric, nursing, obstetrical, or surgical care is provided. [ 99: 3.3.73] (CMP-15)

Informational Note: Examples of health care facilities include, but are not limited to, hospitals, nursing homes, limited care facilities, clinics, medical and dental offices, and ambulatory care centers, whether permanent or movable.

**Health Care Facility's Governing Body.**

The person or persons who have the overall legal responsibility for the operation of a health care facility. [ 99: 3.3.74] (517) (CMP-15)

**Heating Equipment.**

Any equipment that is used for heating purposes and whose heat is generated by induction or dielectric methods. (665) (CMP-12)

**Heating Panel.**

A complete assembly provided with a junction box or a length of flexible conduit for connection to a branch circuit. (CMP-17)

**Heating Panel Set.**

A rigid or nonrigid assembly provided with nonheating leads or a terminal junction assembly identified as being suitable for connection to a wiring system. (CMP-17)

**Heating System.**

A complete system consisting of components such as heating elements, fastening devices, nonheating circuit wiring, leads, temperature controllers, safety signs, junction boxes, raceways, and fittings. (426) (CMP-17)



**Heating System, Impedance. (Impedance Heating System)**

A system in which heat is generated in an object, such as a pipe, rod, or combination of such objects serving as a heating element, by causing current to flow through such objects by direct connection to an ac voltage source from an isolating transformer. In some installations the object is embedded in the surface to be heated or constitutes the exposed component to be heated. (CMP-17)

**Heating System, Induction. (Induction Heating System)**

A system in which heat is generated in a pipeline or vessel wall by inducing current in the pipeline or vessel wall from an external isolated ac field source. (CMP-17)

**Heating System, Skin Effect. (Skin-Effect Heating System)**

A system in which heat is generated on the inner surface of a ferromagnetic envelope embedded in or fastened to the surface to be heated.

Informational Note: Typically, an electrically insulated conductor is routed through and connected to the envelope at the other end. The envelope and the electrically insulated conductor are connected to an ac voltage source from an isolating transformer. (CMP-17)

**Hermetic Refrigerant Motor-Compressor.**

A combination consisting of a compressor and motor, both of which are enclosed in the same housing, with no external shaft or shaft seals, with the motor operating in the refrigerant. (CMP-11)

**Hoistway.**

Any shaftway, hatchway, well hole, or other vertical opening or space in which an elevator or dumbwaiter is designed to operate. (CMP-12)

**Hospital.**

A building or portion thereof used on a 24-hour basis for the medical, psychiatric, obstetrical, or surgical care of four or more inpatients. [ **101** : 3.3.152] (CMP-15)

**Host Sign.**

A sign or outline lighting system already installed in the field that is designated for field conversion of the illumination system with a retrofit kit. (600) (CMP-18)

**Hydromassage Bathtub.**

A permanently installed bathtub equipped with a recirculating piping system, pump, and associated equipment. It is designed so it can accept, circulate, and discharge water upon each use. (680) (CMP-17)

**Identified (as applied to equipment).**

Recognizable as suitable for the specific purpose, function, use, environment, application, and so forth, where described in a particular Code requirement. (CMP-1)

Informational Note: Some examples of ways to determine suitability of equipment for a specific purpose, environment, or application include investigations by a qualified testing laboratory (listing and labeling), an inspection agency, or other organizations concerned with product evaluation.

**In Sight From (Within Sight From) (Within Sight).**

Equipment that is visible and not more than 15 m (50 ft) distant from other equipment is *in sight from* that other equipment. (CMP-1)

Informational Note: See 110.29 for additional information.



**Increased Safety “e”.**

Type of protection applied to electrical equipment that does not produce arcs or sparks in normal service and under specified abnormal conditions, in which additional measures are applied to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks. (CMP-14)

Informational Note: See ANSI/UL 60079-7, *Explosive Atmospheres — Part 7: Equipment Protection by Increased Safety “e”*, for additional information.

**Induction Heating (Induction Melting) (Induction Welding).**

The heating, melting, or welding of a nominally conductive material due to its own I<sup>2</sup>R losses when the material is placed in a varying electromagnetic field. (665) (CMP-12)

**Industrial Control Panel.**

An assembly of two or more components consisting of one of the following: (1) power circuit components only, such as motor controllers, overload relays, fused disconnect switches, and circuit breakers; (2) control circuit components only, such as push buttons, pilot lights, selector switches, timers, switches, and control relays; (3) a combination of power and control circuit components. These components, with associated wiring and terminals, are mounted on, or contained within, an enclosure or mounted on a subpanel. (CMP-11)

Informational Note: The industrial control panel does not include the controlled equipment.

**Industrial Installation, Supervised. (Supervised Industrial Installation)**

The industrial portions of a facility where all of the following conditions are met:

- (1) Conditions of maintenance and engineering supervision ensure that only qualified persons monitor and service the system.
- (2) The premises wiring system has 2500 kVA or greater of load used in industrial process(es), manufacturing activities, or both, as calculated in accordance with Article 220.
- (3) The premises has at least one service or feeder that is more than 150 volts to ground and more than 300 volts phase-to-phase.

This definition excludes installations in buildings used by the industrial facility for offices, warehouses, garages, machine shops, and recreational facilities that are not an integral part of the industrial plant, substation, or control center. (240) (CMP-10)

**Information Technology Equipment (ITE).**

Equipment and systems rated 1000 volts or less, normally found in offices or other business establishments and similar environments classified as ordinary locations, that are used for creation and manipulation of data, voice, video, and similar signals that are not communications equipment and do not process communications circuits. (CMP-12)

Informational Note: See UL 60950-1, *Information Technology Equipment — Safety — Part 1: General Requirements*, or UL 62368-1, *Audio/Video Information and Communication Technology Equipment Part 1: Safety Requirements*, for information on listing requirements for both information technology equipment and communications equipment.

**Information Technology Equipment Room.**

A room within the information technology equipment area that contains the information technology equipment. [ 75: 3.3.15] (CMP-12)

**Innerduct.**

A nonmetallic raceway placed within a larger raceway. (CMP-16)

**Insulated Bus Pipe (IBP).**

A cylindrical solid or hollow conductor with a solid insulation system, having conductive grading layers and a grounding layer imbedded in the insulation, and provided with an overall covering of insulating or metallic material. IBP is also referred to as tubular covered conductor (TCC). (CMP-8)

**Insulated Bus Pipe System.**

An assembly that includes bus pipe, connectors, fittings, mounting structures, and other fittings and accessories. (CMP-8)

**Insulating End.**

An insulator designed to electrically insulate the end of a flat conductor cable (Type FCC). (324) (CMP-6)

**Interactive Mode.**

The operating mode for power production equipment or microgrids that operate in parallel with and are capable of delivering energy to an electric power production and distribution network or other primary source. (CMP-4)

Informational Note: Interactive mode is an operational mode of both interactive systems and of equipment such as interactive inverters.

**Interrupting Rating.**

The highest current at rated voltage that a device is identified to interrupt under standard test conditions. (CMP-10)

Informational Note: Equipment intended to interrupt current at other than fault levels may have its interrupting rating implied in other ratings, such as horsepower or locked rotor current.

**Intersystem Bonding Termination (IBT).**

A device that provides a means for connecting intersystem bonding conductors for communications systems to the grounding electrode system. (CMP-16)

**Intrinsic Safety “i”.**

Type of protection where any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under prescribed test conditions. (CMP-14)

Informational Note: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*; and ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”*, for additional information.

**Intrinsically Safe Apparatus.**

Apparatus in which all the circuits are intrinsically safe. (CMP-14)

Informational Note No. 1: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*, and ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”*, for additional information.

Informational Note No. 2: See ANSI/ISA RP 12.06.01, *Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation — Part 1: Intrinsic Safety*, for installation information.

**Intrinsically Safe Circuit.**

A circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under prescribed test conditions. (CMP-14)

Informational Note: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*, and ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”*, for test conditions.

**Intrinsically Safe Circuits, Different. (Different Intrinsically Safe Circuits)**

Intrinsically safe circuits in which the possible interconnections have not been evaluated and identified as intrinsically safe. (CMP-14)

Informational Note: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*, and ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”*, for additional information.

**Intrinsically Safe System.**

An assembly of interconnected intrinsically safe apparatus, associated apparatus, and interconnecting cables, in which those parts of the system that might be used in hazardous (classified) locations are intrinsically safe circuits. (CMP-14)

Informational Note No. 1: An intrinsically safe system might include more than one intrinsically safe circuit.

Informational Note No. 2: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*; ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”*; and ANSI/UL 60079-25, *Explosive Atmospheres — Part 25: Intrinsically Safe Electrical Systems*, for additional information.

Informational Note No. 3: See ANSI/ISA RP 12.06.01, *Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation — Part 1: Intrinsic Safety*, for installation information.

**Invasive Procedure.**

Any procedure that penetrates the protective surfaces of a patient's body (i.e., skin, mucous membrane, cornea) and that is performed with an aseptic field (procedural site). [Not included in this category are placement of peripheral intravenous needles or catheters used to administer fluids and/or medications, gastrointestinal endoscopies (i.e., sigmoidoscopies), insertion of urethral catheters, and other similar procedures.] [ 99: 3.3.91] (517) (CMP-15)

**Inverter.**

Equipment that changes dc to ac. (CMP-4)

**Inverter, Interactive. (Interactive Inverter)**

Inverter equipment having the capability to operate only in interactive mode. (CMP-13)

**Inverter, Multimode. (Multimode Inverter)**

Inverter equipment capable of operating in both interactive and island modes. (CMP-4)

**Inverter, Stand-alone. (Stand-alone Inverter)**

Inverter equipment having the capabilities to operate only in island mode. (CMP-4)

**Inverter Input Circuit.**

Conductors connected to the dc input of an inverter. (CMP-13)

**Inverter Output Circuit.**

Conductors connected to the ac output of an inverter. (CMP-13)

**Inverter Utilization Output Circuit.**

Conductors between the multimode or stand-alone inverter and utilization equipment. (706) (CMP-13)

**Irrigation Machine.**

An electrically driven or controlled machine, with one or more motors, not hand-portable, and used primarily to transport and distribute water for agricultural purposes. (675) (CMP-7)

**Irrigation Machine, Center Pivot. (Center Pivot Irrigation Machine)**

A multimotored irrigation machine that revolves around a central pivot and employs alignment switches or similar devices to control individual motors. (675) (CMP-7)

**Island Mode.**

The operating mode for power production equipment or microgrids that allows energy to be supplied to loads that are disconnected from an electric power production and distribution network or other primary power source. (CMP-4)

**Isolated (as applied to location).**

Not readily accessible to persons unless special means for access are used. (CMP-1)

**Isolated Power System.**

A system comprising an isolation transformer or its equivalent, a line isolation monitor, and its ungrounded circuit conductors. [ 99: 3.3.93] (517) (CMP-15)

**Isolation Transformer.**

A transformer of the multiple-winding type, with the primary and secondary windings physically separated, that inductively couples its ungrounded secondary winding to the grounded feeder system that energizes its primary winding. [ 99: 3.3.94] (517) (CMP-15)

**Kitchen.**

An area with a sink and permanent provisions for food preparation and cooking. (CMP-2)

**Labeled.**

Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner. (CMP-1)

Informational Note: If a listed product is of such a size, shape, material, or surface texture that it is not possible to apply legibly the complete label to the product, the complete label may appear on the smallest unit container in which the product is packaged.

**Laundry Area.**

An area containing or designed to contain a laundry tray, clothes washer, or clothes dryer. (CMP-2)

**Leakage-Current Detector-Interrupter (LCDI).**

A device provided in a power supply cord or cord set that senses leakage current flowing between or from the cord conductors and interrupts the circuit at a predetermined level of leakage current. (440) (CMP-11)

**LED Sign Illumination System.**

A complete lighting system for use in signs and outline lighting consisting of light-emitting diode (LED) light sources, power supplies, wire, and connectors to complete the installation. (600) (CMP-18)

**Legally Required Standby Systems.**

Those systems required and so classed as legally required standby by municipal, state, federal, or other codes or by any governmental agency having jurisdiction. These systems are intended to automatically supply power to selected loads (other than those classed as emergency systems) in the event of failure of the normal source. (CMP-13)

**Life Safety Branch.**

A system of feeders and branch circuits supplying power for lighting, receptacles, and equipment essential for life safety that is automatically connected to alternate power sources by one or more transfer switches during interruption of the normal power source. [ **99:** 3.3.97] (517) (CMP-15)

**Lighting Assembly, Cord-and-Plug-Connected. (Cord-and-Plug-Connected Lighting Assembly)**

A lighting assembly consisting of a luminaire intended for installation in the wall of a spa, hot tub, or storable pool, and a cord-and-plug-connected transformer or power supply. (680) (CMP-17)

**Lighting Assembly, Through-Wall. (Through-Wall Lighting Assembly)**

A lighting assembly intended for installation above grade, on or through the wall of a pool, consisting of two interconnected groups of components separated by the pool wall. (680) (CMP-17)

**Lighting Outlet.**

An outlet intended for the direct connection of a lampholder or luminaire. (CMP-18)

**Lighting Track. (Track Lighting)**

A manufactured assembly designed to support and energize luminaires that are capable of being readily repositioned on the track. Its length can be altered by the addition or subtraction of sections of track. (CMP-18)

**Limited Care Facility.**

A building or portion of a building used on a 24-hour basis for the housing of four or more persons who are incapable of self-preservation because of age; physical limitation due to accident or illness; or limitations such as intellectual disability/developmental disability, mental illness, or chemical dependency. [ **101:** 3.3.93.2] (CMP-15)

**Limited Finishing Workstation.**

A power-ventilated apparatus that is capable of confining the vapors, mists, residues, dusts, or deposits that are generated by a limited spray application process. Such apparatus is not a spray booth or spray room, as herein defined. [ **33:** 3.3.23.1] (CMP-14)

Informational Note: See NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials*, Section 14.3, for information on limited finishing workstations.

**Line Isolation Monitor.**

A test instrument designed to continually check the balanced and unbalanced impedance from each line of an isolated circuit to ground and equipped with a built-in test circuit to exercise the alarm without adding to the leakage current hazard. [ **99:** 3.3.99] (517) (CMP-15)

**Liquid Immersion “o”.**

Type of protection where electrical equipment is immersed in a protective liquid so that an explosive atmosphere that might be above the liquid or outside the enclosure cannot be ignited. (CMP-14)

Informational Note: See ANSI/UL 60079-6, *Explosive Atmospheres — Part 6: Equipment Protection by Liquid Immersion “o”*, for additional information.

**Listed.**

Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose. (CMP-1)

Informational Note: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. Use of the system employed by the listing organization allows the authority having jurisdiction to identify a listed product.

**Live Parts.**

Energized conductive components. (CMP-1)

**Load Management.**

The process within an energy management system that limits the total electrical load on an electrical supply system to a set value by adjusting or controlling the individual loads. (625) (CMP-12)

Informational Note: Load management is sometimes called *demand-side management* (DSM).

**Location, Anesthetizing. (Anesthetizing Location)**

Any space within a facility that has been designated for the administration of any flammable or nonflammable inhalation anesthetic agent during examination or treatment, including the use of such agents for relative analgesia. (517) (CMP-15)

**Location, Anesthetizing, Flammable. (Flammable Anesthetizing Location)**

Any area of the facility that has been designated to be used for the administration of any flammable inhalation anesthetic agents in the normal course of examination or treatment. (517) (CMP-15)

**Location, Damp. (Damp Location)**

Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture. (CMP-1)

Informational Note: Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold-storage warehouses.

**Location, Dry. (Dry Location)**

A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction. (CMP-1)

**Location, Remote. (Remote Location)**

A location, other than a motion picture or television studio, where a production is filmed or recorded. (530) (CMP-15)



**Location, Wet. (Wet Location)**

A location that is one or more of the following:

- (1) Unprotected and exposed to weather
- (2) Subject to saturation with water and other liquids
- (3) Underground
- (4) In concrete slabs or masonry in direct contact with the earth

(CMP-1)

Informational Note: A vehicle washing area is an example of a wet location saturated with water or other liquids.

**Location, Wet Procedure. (Wet Procedure Location)**

The area in a patient care space where a procedure is performed that is normally subject to wet conditions while patients are present, including standing fluids on the floor or drenching of the work area, either of which condition is intimate to the patient or staff. [ 99: 3.3.187] (517)  
(CMP-15)

Informational Note: Routine housekeeping procedures and incidental spillage of liquids do not define a wet procedure location. [ 99: A.3.3.187]

**Locations, Hazardous (Classified). [Hazardous (Classified) Locations]**

Locations where fire or explosion hazards might exist due to flammable gases, flammable liquid-produced vapors, combustible liquid-produced vapors, combustible dusts, combustible fiber/flyings, or ignitable fibers/flyings. (CMP-14)

**Locations, Unclassified. (Unclassified Locations)**

Locations determined to be neither Class I, Division 1; Class I, Division 2; Zone 0; Zone 1; Zone 2; Class II, Division 1; Class II, Division 2; Class III, Division 1; Class III, Division 2; Zone 20; Zone 21; Zone 22; nor any combination thereof. (CMP-14)

**Long-Time Rating.**

A rating based on an operating interval of 5 minutes or longer. (660) (CMP-12)

**Long-Time Rating (Standby Power).**

A rating based on an operating interval of 5 minutes or longer. (517) (CMP-15)

**Loudspeaker (Speaker).**

Equipment that converts an ac electric signal into an acoustic signal. (640) (CMP-12)

**Low-Voltage Contact Limit.**

A voltage not exceeding the following values:

- (1) 15 volts (RMS) for sinusoidal ac
- (2) 21.2 volts peak for nonsinusoidal ac
- (3) 30 volts for continuous dc
- (4) 12.4 volts peak for dc that is interrupted at a rate of 10 to 200 Hz

(680) (CMP-17)

**Low-Voltage Suspended Ceiling Power Distribution System.**

A system that serves as a support for a finished ceiling surface and consists of a busbar and busbar support system to distribute power to utilization equipment supplied by a Class 2 power supply. (393) (CMP-18)



**Luminaire.**

A complete lighting unit consisting of a light source such as a lamp or lamps, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light. A lampholder itself is not a luminaire. (CMP-18)

**Luminaire, Dry-Niche. (Dry-Niche Luminaire)**

A luminaire intended for installation in the floor or wall of a pool, spa, or fountain in a niche that is sealed against the entry of water. (680) (CMP-17)

**Luminaire, No-Niche. (No-Niche Luminaire)**

A luminaire intended for installation above or below the water without a niche. (680) (CMP-17)

**Luminaire, Wet-Niche. (Wet-Niche Luminaire)**

A luminaire intended for installation in a forming shell mounted in a pool or fountain structure where the luminaire will be completely surrounded by water. (680) (CMP-17)

**Machine Room.**

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. (620) (CMP-12)

**Machine Room and Control Room, Remote. (Remote Machine Room and Control Room)**

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. (620) (CMP-12)

**Machinery, Industrial (Industrial Machine). (Industrial Machinery)**

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. (CMP-12)

**Machinery Space.**

A space inside or outside the hoistway, intended to be accessed with or without full bodily entry, that contains the elevator, dumbwaiter, platform lift, or stairway chairlift equipment and could also contain equipment used directly in connection with the elevator, dumbwaiter, platform lift, or stairway chairlift. (620) (CMP-12)

**Machinery Space and Control Space, Remote. (Remote Machinery Space and Control Space)**

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. (620) (CMP-12)

**Manufactured Home.**

A structure, transportable in one or more sections, which in the traveling mode is 2.4 m (8 ft) or more in width or 12.2 m (40 ft) or more in length, or when erected on site is 29.77 m<sup>2</sup> (320 ft<sup>2</sup>) or more is built on a permanent chassis and is designed to be used as a dwelling with or without a permanent foundation, whether or not connected to the utilities, and includes plumbing, heating, air conditioning, and electrical systems contained therein. The term includes any structure that meets all the requirements of this paragraph except the size requirements and with respect to which the manufacturer voluntarily files a certification required by the regulatory agency. Calculations used to determine the number of square meters (square feet) in a structure are based on the structure's exterior dimensions and include all expandable rooms, cabinets, and other projections containing interior space, but do not include bay windows. [ **501:** 1.2.12] (CMP-7)

Informational Note No. 1: Unless otherwise indicated, the term *mobile home* includes manufactured home and excludes park trailers.

Informational Note No. 2: See the applicable building code for definition of the term *permanent foundation*.

Informational Note No. 3: See 24 CFR Part 3280, *Manufactured Home Construction and Safety Standards, of the Federal Department of Housing and Urban Development*, for additional information on the definition.

**Manufactured Wiring System.**

A system containing component parts that are assembled in the process of manufacture and cannot be inspected at the building site without damage or destruction to the assembly and used for the connection of luminaires, utilization equipment, continuous plug-in type busways, and other devices. (604) (CMP-7)

**Marina.**

A facility, generally on the waterfront, that stores and services boats in berths, on moorings, and in dry storage or dry stack storage. [ **303:** 3.3.13] (555) (CMP-7)

**Maximum Output Power.**

The maximum power delivered by an amplifier into its rated load as determined under specified test conditions. (640) (CMP-12)

Informational Note: The maximum output power can exceed the manufacturer's rated output power for the same amplifier.

**Maximum Output Power.**

The maximum 1 minute average power output a wind turbine produces in normal steady-state operation (instantaneous power output can be higher). (694) (CMP-4)

**Maximum Voltage.**

The greatest difference in potential produced between any two conductors of a wind turbine circuit. (694) (CMP-4)

**Maximum Water Level.**

The highest level that water can reach before it spills out. (680) (CMP-17)

**Medical Office.**

A building or part thereof in which the following occur:

- (1) Examinations and minor treatments/procedures performed under the continuous supervision of a medical professional;
- (2) The use of limited to minimal sedation and treatment or procedures that do not render the patient incapable of self-preservation under emergency conditions; and
- (3) No overnight stays for patients or 24-hour operations.

[ 99: 3.3.110] (CMP-15)

**Membrane Enclosure.**

A temporary enclosure used for the spraying of workpieces that cannot be moved into a spray booth where open spraying is not practical due to proximity to other operations, finish quality, or concerns such as the collection of overspray. (CMP-14)

Informational Note: See NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials*, Chapter 18, for information on the construction and use of membrane enclosures.

**Messenger-Supported Wiring.**

An exposed wiring support system using a messenger wire to support insulated conductors by any one of the following:

- (1) A messenger with rings and saddles for conductor support
- (2) A messenger with a field-installed lashing material for conductor support
- (3) Factory-assembled aerial cable
- (4) Multiplex cables utilizing a bare conductor, factory assembled and twisted with one or more insulated conductors, such as duplex, triplex, or quadruplex type of construction

(CMP-6)

**Messenger Wire (Messenger).**

A wire that is run along with or integral with a cable or conductor to provide mechanical support for the cable or conductor. (CMP-6)

**Metal Shield Connections.**

Means of connection for flat conductor cables (Type FCC) designed to electrically and mechanically connect a metal shield to another metal shield, to a receptacle housing or self-contained device, or to a transition assembly. (324) (CMP-6)

**Microgrid.**

An electric power system capable of operating in island mode and capable of being interconnected to an electric power production and distribution network or other primary source while operating in interactive mode, which includes the ability to disconnect from and reconnect to a primary source and operate in island mode. (CMP-4)

Informational Note No. 1: See IEEE 1547, *IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interface*; IEEE 2030.7, *IEEE Standard for the Specification of Microgrid Controllers*; IEEE 2030.8, *IEEE Standard for the Testing of Microgrid Controllers*; and UL1008B, *Outline for Source Interconnection*, for additional information about microgrids.

Informational Note No. 2: Examples of power sources in microgrids include such items as photovoltaic systems, generators, fuel cell systems, wind electric systems, energy storage systems, electric vehicles that are used as a source of supply, and electrical power conversion from other energy sources.

**Microgrid, Health Care (Health Care Microgrid System). (Health Care Microgrid)**

A group of interconnected loads and distributed energy resources within clearly defined boundaries that acts as a single controllable entity with respect to the utility. [ 99: 3.3.75] (517) (CMP-15)

**Microgrid Control System (MCS).**

A structured control system that manages microgrid operations, functionalities for utility interoperability, islanded operations, and transitions. (CMP-4)

Informational Note: MCS differ from multiple standby generators or uninterruptible power supplies that are evaluated and rated to operate as a single source of backup power upon loss of the primary power source. MCS functions include coordination, transitions, and interoperability between multiple power sources.

**Microgrid Interconnect Device (MID).**

A device that enables a microgrid system to separate from and reconnect to an interconnected primary power source. (CMP-4)

**Mixer.**

Equipment used to combine and level match a multiplicity of electronic signals, such as from microphones, electronic instruments, and recorded audio. (640) (CMP-12)

**Mobile.**

X-ray equipment mounted on a permanent base with wheels and/or casters for moving while completely assembled. (660) (CMP-12)

**Mobile Home.**

A factory-assembled structure or structures transportable in one or more sections that are built on a permanent chassis and designed to be used as a dwelling without a permanent foundation where connected to the required utilities and that include the plumbing, heating, air-conditioning, and electrical systems contained therein. (CMP-7)

Informational Note: Unless otherwise indicated, the term *mobile home* includes manufactured home and excludes park trailers.

**Mobile Home Lot.**

A designated portion of a mobile home park designed for the accommodation of one mobile home and its accessory buildings or structures for the exclusive use of its occupants. (550) (CMP-7)

**Mobile Home Park.**

A contiguous parcel of land that is used for the accommodation of mobile homes that are intended to be occupied. (550) (CMP-7)

**Module, AC. (AC Module)**

A complete, environmentally protected unit consisting of solar cells, inverter, and other components, designed to produce ac power. (690) (CMP-4)

**Module System, AC. (AC Module System)**

An assembly of ac modules, wiring methods, materials, and subassemblies that are evaluated, identified, and defined as a system. (690) (CMP-4)

**Momentary Rating.**

A rating based on an operating interval that does not exceed 5 seconds. (660) (CMP-12)

**Momentary Rating (Maximum Power).**

A rating based on an operating interval that does not exceed 5 seconds. (517) (CMP-15)

**Monitor.**

An electrical or electronic means to observe, record, or detect the operation or condition of the electric power system or apparatus. (750) (CMP-13)

**Monopole Circuit.**

An electrical subset of a PV system that has two conductors in the output circuit, one positive (+) and one negative (-). (690) (CMP-4)

**Monorail.**

Overhead track and hoist system for moving material around the boatyard or moving and launching boats. [ **303:** 3.3.16] (555) (CMP-7)

**Mooring(s).**

Any place where a boat is wet stored or berthed. [ **303:** 3.3.17] (555) (CMP-7)

**Motion Picture Studio (Television Studio).**

A building, group of buildings, other structures, and outdoor areas designed, constructed, permanently altered, designated, or approved for the purpose of motion picture or television production. (530) (CMP-15)

**Motor Control Center.**

An assembly of one or more enclosed sections having a common power bus and principally containing motor control units. (CMP-11)

**Motor Fuel Dispensing Facility.**

That portion of a property where motor fuels are stored and dispensed from fixed equipment into the fuel tanks of motor vehicles or marine craft or into approved containers, including all equipment used in connection therewith. [ **30A:** 3.3.11] (CMP-14)

Informational Note: See 511.1 with respect to electrical wiring and equipment for other areas used as lubritoriums, service rooms, repair rooms, offices, salesrooms, compressor rooms, and similar locations.

**Multi-Circuit Cable Outlet Enclosure.**

An enclosure containing one or more multi-circuit plugs, receptacles, or both. (520) (CMP-15)

**Multioutlet Assembly.**

A surface, flush, or freestanding assemblage with a raceway and fittings or other enclosure provided with one or more receptacles, for the purpose of supplying power to utilization equipment. (CMP-18)

**Nacelle.**

An enclosure housing the alternator and other parts of a wind turbine. (694) (CMP-4)

**Neon Tubing.**

Electric-discharge luminous tubing, including cold cathode luminous tubing, that is manufactured into shapes to illuminate signs, form letters, parts of letters, skeleton tubing, outline lighting, other decorative elements, or art forms and filled with various inert gases. (600) (CMP-18)

**Network Interface Unit (NIU).**

A device that converts a broadband signal into component voice, audio, video, data, and interactive services signals and provides isolation between the network power and the premises signal circuits. These devices often contain primary and secondary protectors. (CMP-16)

**Network Terminal.**

A device that converts network-provided signals (optical, electrical, or wireless) into component signals, including voice, audio, video, data, wireless, optical, and interactive services, and is considered a network device on the premises that is connected to a communications service provider and is powered at the premises. (CMP-16)

**Neutral Conductor.**

The conductor connected to the neutral point of a system that is intended to carry current under normal conditions. (CMP-5)

**Neutral Point.**

The common point on a wye-connection in a polyphase system or midpoint on a single-phase, 3-wire system, or midpoint of a single-phase portion of a 3-phase delta system, or a midpoint of a 3-wire, direct-current system. (CMP-5)

Informational Note: At the neutral point of the system, the vectorial sum of the nominal voltages from all other phases within the system that utilize the neutral, with respect to the neutral point, is zero potential.

**Nonautomatic.**

Requiring human intervention to perform a function. (CMP-1)

**Nonincendive Circuit.**

A circuit, other than field wiring, in which any arc or thermal effect produced under intended operating conditions of the equipment, is not capable, under specified test conditions, of igniting the flammable gas–air, vapor–air, or dust–air mixture. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Nonincendive Component.**

A component having contacts for making or breaking an incendive circuit and the contacting mechanism is constructed so that the component is incapable of igniting the specified flammable gas–air or vapor–air mixture. The housing of such a component is not intended to exclude the flammable atmosphere or contain an explosion. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Nonincendive Equipment.**

Equipment having electrical/electronic circuitry that is incapable, under normal operating conditions, of causing ignition of a specified flammable gas–air, vapor–air, or dust–air mixture due to arcing or thermal means. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Nonincendive Field Wiring.**

Wiring that enters or leaves an equipment enclosure and, under normal operating conditions of the equipment, is not capable, due to arcing or thermal effects, of igniting the flammable gas–air, vapor–air, or dust–air mixture. Normal operation includes opening, shorting, or grounding the field wiring. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.



**Nonincendive Field Wiring Apparatus.**

Apparatus intended to be connected to nonincendive field wiring. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Nonlinear Load.**

A load where the wave shape of the steady-state current does not follow the wave shape of the applied voltage. (CMP-1)

Informational Note: Electronic equipment, electronic/electric-discharge lighting, adjustable-speed drive systems, and similar equipment may be nonlinear loads.

**Nonmetallic Extension.**

An assembly of two insulated conductors within a nonmetallic jacket or an extruded thermoplastic covering. The classification includes surface extensions intended for mounting directly on the surface of walls or ceilings. (CMP-6)

**Nonsparking.**

Constructed to minimize the risk of arcs or sparks capable of creating an ignition hazard during conditions of normal operation. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Normal/Emergency Power Source.**

A power source on the output side of a transfer switch or uninterruptible power supply that is automatically available upon loss of normal power. (700) (CMP-13).

**Normal High-Water Level (as applies to electrical datum plane distances).**

Natural or Artificially Made Shorelines: An elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly the point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial.

Rivers and Streams: The elevation of the top of the bank of the channel. Streams, rivers, and tributaries that are prone to flooding and effects of water runoff shall consider the "bankfull stage" where an established gauge height at a given location along a river or stream, above which a rise in water surface will cause the river or stream to overflow the lowest natural stream bank somewhere in the corresponding reach.

Flood Control Bodies of Water: The flood pool maximum water surface elevation of a reservoir, equal to the elevation of the spillway.

Nonflood Control Bodies of Water: The flowage easement boundary in which the highest water surface elevation defined by the area existing between governmental-owned property line(s) and a contour line with perpetual rights to flood the area in connection with the operation of the reservoir.

(CMP-7)

**Nurses' Station.**

A space intended to provide a center of nursing activity for a group of nurses serving bed patients, where patient calls are received, nurses dispatched, nurses' notes written, inpatient charts prepared, and medications prepared for distribution to patients. Where such activities are carried on in more than one location within a nursing unit, all such separate spaces are considered a to be parts of the nurses' station. (517) (CMP-15)



**Nursing Home.**

A building or portion of a building used on a 24-hour basis for the housing and nursing care of four or more persons who, because of mental or physical incapacity, might be unable to provide for their own needs and safety without the assistance of another person. [ 101 : 3.3.150.2] (CMP-15)

**Office Furnishing.**

Cubicle panels, partitions, study carrels, workstations, desks, shelving systems, and storage units that may be mechanically and electrically interconnected to form an office furnishing system. (CMP-18)

**Oil Immersion.**

Electrical equipment immersed in a protective liquid so that an explosive atmosphere that might be above the liquid or outside the enclosure cannot be ignited. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Open Wiring on Insulators.**

An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings. (CMP-6)

**Operating Device.**

The car switch, pushbuttons, key or toggle switch(s), or other devices used to activate the operation controller. (620) (CMP-12)

**Operator.**

The individual responsible for starting, stopping, and controlling an amusement ride or supervising a concession. (525) (CMP-15)

**Optical Radiation.**

Electromagnetic radiation at wavelengths in vacuum between the region of transition to X-rays and the region of transition to radio waves that is approximately between 1 nm and 1000  $\mu\text{m}$ . (CMP-14)

Informational Note: See ANSI/UL 60079-28, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*, for information on types of protection that can be applied to minimize the risk of ignition in explosive atmospheres from optical radiation in the wavelength range from 380 nm to 10  $\mu\text{m}$ .

**Optical Radiation, Inherently Safe “op is”. (Inherently Safe Optical Radiation “op is”)**

Type of protection to minimize the risk of ignition in explosive atmospheres from optical radiation where visible or infrared radiation is incapable of producing sufficient energy under normal or specified fault conditions to ignite a specific explosive atmosphere. (CMP-14)

Informational Note: See ANSI/UL 60079-28, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*, for additional information.

**Optical Radiation, Protected “op pr”. (Protected Optical Radiation “op pr”)**

Type of protection to minimize the risk of ignition in explosive atmospheres from optical radiation where visible or infrared radiation is confined inside optical fiber or other transmission medium under normal constructions or constructions with additional mechanical protection based on the assumption that there is no escape of radiation from the confinement. (CMP-14)

Informational Note: See ANSI/UL 60079-28, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*, for additional information.

**Optical System With Interlock “op sh”.**

Type of protection to minimize the risk of ignition in explosive atmospheres from optical radiation where visible or infrared radiation is confined inside optical fiber or other transmission medium with interlock cutoff provided to reliably reduce the unconfined beam strength to safe levels within a specified time in case the confinement fails and the radiation becomes unconfined. (CMP-14)

Informational Note: See ANSI/UL 60079-28, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*, for additional information.

**Optional Standby Systems.**

Those systems intended to supply power to public or private facilities or property where life safety does not depend on the performance of the system. These systems are intended to supply on-site generated or stored power to selected loads either automatically or manually. (CMP-13)

**Organ, Electronic. (Electronic Organ)**

A musical instrument that imitates the sound of a pipe organ by producing sound electronically. (CMP-12)

Informational Note: Most new electronic organs produce sound digitally and are called digital organs.

**Organ, Pipe. (Pipe Organ)**

A musical instrument that produces sound by driving pressurized air (called *wind*) through pipes selected via a keyboard. (CMP-12)

**Organ, Pipe Sounding Apparatus. (Pipe Organ Sounding Apparatus) (Pipe Organ Chamber).**

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. (CMP-12)

**Outlet.**

A point on the wiring system at which current is taken to supply utilization equipment. (CMP-1)

**Outlet Box Hood.**

A housing shield intended to fit over a faceplate for flush-mounted wiring devices, or an integral component of an outlet box or of a faceplate for flush-mounted wiring devices. The hood does not serve to complete the electrical enclosure; it reduces the risk of water coming in contact with electrical components within the hood, such as attachment plugs, current taps, surge protective devices, direct plug-in transformer units, or wiring devices. (CMP-18)

**Outline Lighting.**

An arrangement of incandescent lamps, electric-discharge lighting, or other electrically powered light sources to outline or call attention to certain features such as the shape of a building or the decoration of a window. (CMP-18)

**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). (625) (CMP-12)

**Output Cable to the Primary Pad.**

A multiconductor, 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. (625) (CMP-12)

**Overcurrent.**

Any current in excess of the rated current of equipment or the ampacity of a conductor. It may result from overload, short circuit, or ground fault. (CMP-10)

Informational Note: A current in excess of rating may be accommodated by certain equipment and conductors for a given set of conditions. Therefore, the rules for overcurrent protection are specific for particular situations.

**Overcurrent Protective Device, Branch-Circuit. (Branch-Circuit Overcurrent Protective Device)**

A device capable of providing protection for service, feeder, and branch circuits and equipment over the full range of overcurrents between its rated current and its interrupting rating. (CMP-10)

**Overcurrent Protective Device, Current-Limiting. (Current-Limiting Overcurrent Protective Device)**

A device that, when interrupting currents in its current-limiting range, reduces the current flowing in the faulted circuit to a magnitude substantially less than that obtainable in the same circuit if the device were replaced with a solid conductor having comparable impedance. (240) (CMP-10)

**Overcurrent Protective Device, Supplementary. (Supplementary Overcurrent Protective Device)**

A device intended to provide limited overcurrent protection for specific applications and utilization equipment such as luminaires and appliances. This limited protection is in addition to the protection provided in the required branch circuit by the branch-circuit overcurrent protective device. (CMP-10)

**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. (626) (CMP-12)

**Overload.**

Operation of equipment in excess of normal, full-load rating, or of a conductor in excess of its ampacity that, when it persists for a sufficient length of time, would cause damage or dangerous overheating. A fault, such as a short circuit or ground fault, is not an overload. (CMP-10)

**Packaged Therapeutic Tub or Hydrotherapeutic Tank Equipment Assembly.**

A factory-fabricated unit consisting of water-circulating, heating, and control equipment mounted on a common base, intended to operate a therapeutic tub or hydrotherapeutic tank. Equipment can include pumps, air blowers, heaters, lights, controls, sanitizer generators, and so forth. (680) (CMP-17)

**Panelboard.**

A single panel or group of panel units designed for assembly in the form of a single panel, including buses and automatic overcurrent devices, and equipped with or without switches for the control of light, heat, or power circuits; designed to be placed in a cabinet, enclosure, or cutout box placed in or against a wall, partition, or other support; and accessible only from the front. (CMP-9)

**Panelboard, Enclosed. (Enclosed Panelboard)**

An assembly of buses and connections, overcurrent devices, and control apparatus with or without switches or other equipment, installed in a cabinet, cutout box, or enclosure suitable for a panelboard application. (CMP-9)

**Park Electrical Wiring Systems.**

All of the electrical wiring, luminaires, equipment, and appurtenances related to electrical installations within a mobile home park, including the mobile home service equipment. (550) (CMP-7)

**Park Trailer.**

A unit that is built on a single chassis mounted on wheels and has a gross trailer area not exceeding  $37\text{ m}^2$  ( $400\text{ ft}^2$ ) in the set-up mode. (552) (CMP-7)

**Part-Winding Motors.**

A part-winding start induction or synchronous motor is one that is arranged for starting by first energizing part of its primary (armature) winding and, subsequently, energizing the remainder of this winding in one or more steps. A standard part-winding start induction motor is arranged so that one-half of its primary winding can be energized initially, and, subsequently, the remaining half can be energized, both halves then carrying equal current. (CMP 11)

Informational Note: A hermetic refrigerant motor-compressor is not considered a standard part-winding start induction motor.

**Passenger Transportation Facilities.**

Any area open to the public associated with passenger transportation such as an airport, bus terminal, highway rest stop and service area, marina, seaport, ferry slip, subway station, train station, or port of entry. (CMP-18)

**Patient Bed Location.**

The location of a patient sleeping bed, or the bed or procedure table of a Category 1 space. [ 99: 3.3.138] (CMP-15)

**Patient Care-Related Electrical Equipment.**

Electrical equipment appliance that is intended to be used for diagnostic, therapeutic, or monitoring purposes in a patient care vicinity. [ 99: 3.3.139] (517) (CMP-15)

**Patient Care Space Category.**

Any space of a health care facility wherein patients are intended to be examined or treated. [ 99: 3.3.140] (517) (CMP-15)

Informational Note No. 1: The health care facility's governing body designates patient care space in accordance with the type of patient care anticipated.

Informational Note No. 2: Business offices, corridors, lounges, day rooms, dining rooms, or similar areas typically are not classified as patient care spaces. [ 99: A.3.3.140]

**Category 1 Space (Category 1).**

Space in which failure of equipment or a system is likely to cause major injury or death of patients, staff, or visitors. [ 99: 3.3.140.1] (CMP-15)

Informational Note: These spaces, formerly known as critical care rooms, are typically where patients are intended to be subjected to invasive procedures and connected to line-operated, patient care-related appliances. Examples include, but are not limited to, special care patient rooms used for critical care, intensive care, and special care treatment rooms such as angiography laboratories, cardiac catheterization laboratories, delivery rooms, operating rooms, post-anesthesia care units, trauma rooms, and other similar rooms. [ 99: A.3.3.140.1]

**Category 2 Space (Category 2).**

Space in which failure of equipment or a system is likely to cause minor injury to patients, staff, or visitors. [ 99: 3.3.140.2] (CMP-15)

Informational Note: These spaces were formerly known as general care rooms. Examples include, but are not limited to, inpatient bedrooms, dialysis rooms, in vitro fertilization rooms, procedural rooms, and similar rooms. [ 99: A.3.3.140.2]

**Category 3 Space (Category 3).**

Space in which the failure of equipment or a system is not likely to cause injury to patients, staff, or visitors but can cause discomfort. [ 99: 3.3.140.3] (517) (CMP-15)

Informational Note: These spaces, formerly known as basic care rooms, are typically where basic medical or dental care, treatment, or examinations are performed. Examples include, but are not limited to, examination or treatment rooms in clinics, medical and dental offices, nursing homes, and limited care facilities. [ 99: A.3.3.140.3]

**Category 4 Space (Category 4).**

Space in which failure of equipment or a system is not likely to have a physical impact on patient care. [ 99: 3.3.140.4] (517) (CMP-15)

Informational Note: These spaces were formerly known as support rooms. Examples of support spaces include, but are not limited to, anesthesia work rooms, sterile supply, laboratories, morgues, waiting rooms, utility rooms, and lounges. [ 99: A.3.3.140.4]

**Patient Care Vicinity.**

A space, within a location intended for the examination and treatment of patients, extending 1.8 m (6 ft) beyond the normal location of the bed, chair, table, treadmill, or other device that supports the patient during examination and treatment and extending vertically to 2.3 m (7 ft 6 in.) above the floor. [ 99: 3.3.141] (517) (CMP-15)

**Patient Equipment Grounding Point.**

A jack or terminal that serves as the collection point for redundant grounding of electric appliances serving a patient care vicinity or for grounding other items in order to eliminate electromagnetic interference problems. [ 99: 3.3.142] (517) (CMP-15)

**Performance Area.**

The stage and audience seating area associated with a temporary stage structure, whether indoors or outdoors, constructed of scaffolding, truss, platforms, or similar devices, that is used for the presentation of theatrical or musical productions or for public presentations. (520) (CMP-15)

**Permanent Amusement Attraction.**

A ride device, entertainment device, or a combination of both that is installed such that portability or relocation is impracticable. (522) (CMP-15)

**Permanently Installed Decorative Fountains and Reflection Pools.**

Those that are constructed in the ground, on the ground, or in a building in such a manner that the fountain cannot be readily disassembled for storage, whether or not served by electrical circuits of any nature. These units are primarily constructed for their aesthetic value and are not intended for swimming or wading. (680) (CMP-17)

**Personnel Protection System (as applied to EVSE).**

A system of personnel protection devices and constructional features that when used together provide protection against electric shock of personnel. (625) (CMP-12)

**Phase, Manufactured. (Manufactured Phase)**

The phase that originates at the phase converter and is not solidly connected to either of the single-phase input conductors. (CMP-13)

**Phase Converter.**

An electrical device that converts single-phase power to 3-phase electric power. (CMP-13)

Informational Note: Phase converters have characteristics that modify the starting torque and locked-rotor current of motors served, and consideration is required in selecting a phase converter for a specific load.

**Phase Converter, Rotary. (Rotary-Phase Converter)**

A device that consists of a rotary transformer and capacitor panel(s) that permits the operation of 3-phase loads from a single-phase supply. (455) (CMP-13)

**Phase Converter, Static. (Static-Phase Converter)**

A device without rotating parts, sized for a given 3-phase load to permit operation from a single-phase supply. (455) (CMP-13)

**Photovoltaic Cell (PV). (Solar Cell).**

The basic photovoltaic device that generates dc electricity when exposed to light. (CMP-4)

**Pier.**

A structure extending over the water and supported on a fixed foundation (fixed pier), or on flotation (floating pier), that provides access to the water. [ 303: 3.3.18] (CMP-7)

**Pier, Fixed. (Fixed Pier)**

Pier constructed on a permanent, fixed foundation, such as on piles, that permanently establishes the elevation of the structure deck with respect to land. [ 303: 3.3.18.2] (CMP-7)

**Pier, Floating. (Floating Pier)**

Pier designed with inherent flotation capability that allows the structure to float on the water surface and rise and fall with water level changes. [ 303: 3.3.18.3] (CMP-7)

**Pipeline.**

A length of pipe including pumps, valves, flanges, control devices, strainers, and/or similar equipment for conveying fluids. (CMP-17)

**Plenum.**

A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system. (CMP-3)

**Plenum Cable, Cable Routing Assemblies, and Raceways.**

Cables, cable routing assemblies, and raceways that have adequate fire-resistant and low smoke-producing characteristics and are suitable for use in ducts, plenums, and other spaces used for environmental air. (722) (CMP-3)

**Point of Entrance.**

The point within a building at which the wire or cable emerges from an external wall, from the roof, or from a concrete floor slab. (CMP-16)

**Pool.**

Manufactured or field-constructed equipment designed to contain water on a permanent or semipermanent basis and used by persons for swimming, wading, immersion, or therapeutic purposes, but not including bodies of water incorporated as part of an industrial process or lakes, lagoons, surf parks, or other natural and man-made bodies of water that may incorporate swimming and swimming areas. (680) (CMP-17)

Informational Note: Natural and man-made bodies of water, which includes lakes, lagoons, surf parks, or other similar bodies of water, are addressed in Article 682 .

**Pool, Immersion. (Immersion Pool)**

A pool for ceremonial or ritual immersion of users, which is designed and intended to have its contents drained or discharged. (680) (CMP-17)

**Pool, Permanently Installed Swimming, Wading, Immersion, and Therapeutic. (Permanently Installed Swimming, Wading, Immersion, and Therapeutic Pools)**

Those that are constructed or installed in the ground or partially in the ground, and all pools installed inside of a building, whether or not served by electrical circuits of any nature. (680) (CMP-17)



**Pool, Storable; used for Swimming, Wading, or Immersion (Storable Immersion Pool): (Storable Pool)**

Pools installed entirely on or above the ground that are intended to be stored when not in use and are designed for ease of relocation, regardless of water depth. (680) (CMP-17)

**Pool Cover, Electrically Operated. (Electrically Operated Pool Cover)**

Motor-driven equipment designed to cover and uncover the water surface of a pool by means of a flexible sheet or rigid frame. (680) (CMP-17)

**Pool Lift, Electrically Powered. (Electrically Powered Pool Lift)**

An electrically powered lift that provides accessibility for people with disabilities to and from a pool or spa. (680) (CMP-17)

**Portable.**

A device intended for indoor or outdoor use that is designed to be hand-carried from location to location, or easily transported without the use of other devices or equipment. (625) (CMP-12)

**Portable.**

X-ray equipment designed to be hand-carried. (660) (CMP-12)

**Portable (as applied to equipment).**

Equipment that is actually moved or can easily be moved from one place to another in normal use. (680) (CMP-17)

**Portable Power Distribution Unit.**

A power distribution box containing receptacles and overcurrent devices. (520) (CMP-15)

Informational Note: See ANSI/UL 1640, *Portable Power-Distribution Equipment*, for information on portable power distribution units.

**Portable Structures.**

Units designed to be moved including, but not limited to, amusement rides, attractions, concessions, tents, trailers, trucks, and similar units. (525) (CMP-15)

**Portable Substation.**

A portable assembly, usually mounted on a trailer, containing primary and secondary switchgear and a transformer. (530) (CMP-15)

**Powder Filling “q”.**

Type of protection where electrical parts capable of igniting an explosive atmosphere are fixed in position and completely surrounded by filling material (glass or quartz powder) to prevent the ignition of an external explosive atmosphere. (CMP-14)

Informational Note: See ANSI/UL 60079-5, *Explosive Atmospheres — Part 5: Equipment protection by powder filling “q”*, for additional information.

**Power Outlet.**

An enclosed assembly that may include receptacles, circuit breakers, fuseholders, fused switches, buses, and watt-hour meter mounting means; intended to supply and control power to mobile homes, recreational vehicles, park trailers, or boats or to serve as a means for distributing power required to operate mobile or temporarily installed equipment. (CMP-7)

**Power Outlet, Marina. (Marina Power Outlet)**

An enclosed assembly that can include equipment such as receptacles, circuit breakers, fused switches, fuses, watt-hour meters, panelboards, and monitoring means identified for marina use. (555) (CMP-7)



**Power Production Equipment.**

Electrical generating equipment supplied by any source other than a utility service, up to the source system disconnecting means. (CMP-4)

Informational Note: Examples of power production equipment include such items as generators, solar photovoltaic systems, and fuel cell systems.

**Power Source Output Conductors.**

The conductors between power production equipment and the service or other premises wiring. (CMP-4)

**Power Supply.**

A Class 2 power supply connected between the branch-circuit power distribution system and the busbar low-voltage suspended ceiling power distribution system. (393) (CMP-18)

**Power-Supply Cord.**

An assembly consisting of an attachment plug and a length of flexible cord connected to utilization equipment. (CMP-6)

**Premises.**

The land and buildings located on the user's side of the point of demarcation between the communications service provider and the user. (800) (CMP-16)

**Premises-Powered.**

Using power provided locally from the premises. (CMP-16)

**Premises Wiring (System).**

Interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all their associated hardware, fittings, and wiring devices, both permanently and temporarily installed. This includes one of the following:

- (1) Wiring from the service point or power source to the outlets
- (2) Wiring from and including the power source to the outlets where there is no service point

Such wiring does not include wiring internal to appliances, luminaires, motors, controllers, motor control centers, and similar equipment. (CMP-1)

Informational Note: Power sources include, but are not limited to, interconnected or stand-alone batteries, solar photovoltaic systems, other distributed generation systems, or generators.

**Pressurized.**

The process of supplying an enclosure with a protective gas with or without continuous flow at sufficient pressure to prevent the entrance of combustible dust or ignitable fibers/flyings. (CMP-14)

**Pressurized Enclosure "p".**

Type of protection for electrical equipment that uses the technique of guarding against the ingress of the external atmosphere, which might be explosive, into an enclosure by maintaining a protective gas therein at a pressure above that of the external atmosphere. (CMP-14)

Informational Note: See ANSI/UL-60079-2, *Explosive Atmospheres — Part 2: Equipment protection by pressurized enclosures "p"*, for additional information.

**Pressurized Room “p”.**

A room volume protected by pressurization and of sufficient size to permit the entry of a person who might occupy the room. (CMP-14)

Informational Note: See ANSI/UL 60079-13, *Explosive Atmospheres — Part 13: Equipment protection by pressurized room “p” and artificially ventilated room “v”*, for information on the requirements for rooms intended for human entry where pressurization is used as a means of reducing the risk of explosion.

**Primary Pad.**

A device external to the EV that transfers power via the contactless coupling as part of a wireless power transfer system. (625) (CMP-12)

**Primary Source.**

An electric utility or another source of power that acts as the main forming and stabilizing source in an electric power system. (CMP-4)

**Prime Mover.**

The machine that supplies the mechanical horsepower to a generator. (CMP-13)

**Process Seal.**

A seal between electrical systems and flammable or combustible process fluids where a failure could allow the migration of process fluids into the premises' wiring system. (CMP-14)

Informational Note: See ANSI/UL 122701, *Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids*, for additional information.

**Production Areas.**

Areas where portable electrical equipment is used to implement the capture of images. (530) (CMP-15)

**Projector, Nonprofessional. (Nonprofessional Projector)**

Those types of projectors that do not comply with the definition of *Professional-Type Projector*. (540) (CMP-15)

**Projector, Professional-Type. (Professional-Type Projector)**

A type of projector using 35- or 70-mm film that has a minimum width of 35 mm (1  $\frac{3}{8}$  in.) and has on each edge 212 perforations per meter (5.4 perforations per inch), or a type using carbon arc, xenon, or other light source equipment that develops hazardous gases, dust, or radiation. (540) (CMP-15)

**Proscenium.**

The wall and arch that separates the stage from the auditorium (i.e., house). (520) (CMP-15)

**Protection by Enclosure “t”.**

Type of protection for explosive dust atmospheres where electrical equipment is provided with an enclosure providing dust ingress protection and a means to limit surface temperatures. (CMP-14)

Informational Note: See ANSI/UL 60079-31, *Explosive Atmospheres — Part 31: Equipment Dust Ignition Protection by Enclosure “t”*, for additional information.

**Psychiatric Hospital.**

A building used exclusively for the psychiatric care, on a 24-hour basis, of four or more inpatients. (517) (CMP-15)

**Purged and Pressurized.**

The process of (1) purging, supplying an enclosure with a protective gas at a sufficient flow and positive pressure to reduce the concentration of any flammable gas or vapor initially present to an acceptable level; and (2) pressurization, supplying an enclosure with a protective gas with or without continuous flow at sufficient pressure to prevent the entrance of a flammable gas or vapor, a combustible dust, or an ignitable fiber. (CMP-14)

Informational Note: See NFPA 496, *Standard for Purged and Pressurized Enclosures for Electrical Equipment*, for additional information.

**Purpose-Built.**

A custom luminaire, a piece of lighting equipment, or an effect that is constructed for a specific purpose and is not serially manufactured or available for general sale. (530) (CMP-15)

**PV DC Circuit (PV System DC Circuit).**

Any dc conductor in PV source circuits, PV string circuits, and PV dc-to-dc converter circuits. (690) (CMP-4)

**PV DC Circuit, Source. (PV Source Circuit)**

The PV dc circuit conductors between modules in a PV string circuit, and from PV string circuits or dc combiners, to dc combiners, electronic power converters, or a dc PV system disconnecting means. (690) (CMP-4)

**PV DC Circuit, String. (PV String Circuit)**

The PV source circuit conductors of one or more series-connected PV modules. (690) (CMP-4)

**PV Module (Module).**

A complete, environmentally protected unit consisting of solar cells and other components designed to produce dc power. (CMP-4)

**PV (Photovoltaic) System (PV System) (Photovoltaic System).**

The total components, circuits, and equipment up to and including the PV system disconnecting means that, in combination, convert solar energy into electric energy. (CMP-4)

**Qualified Person.**

One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved. (CMP-1)

Informational Note: See NFPA 70E-2021, *Standard for Electrical Safety in the Workplace*, for electrical safety training requirements.

**Raceway.**

An enclosed channel designed expressly for holding wires, cables, or busbars, with additional functions as permitted in this *Code*. (CMP-8)

**Raceway Cell.**

A single enclosed tubular space in a cellular metal or concrete floor member, the axis of the cell being parallel to the axis of the floor member. (CMP-8)

**Raceway, Cellular Metal Floor. (Cellular Metal Floor Raceway)**

The hollow spaces of cellular metal floors, together with suitable fittings, that may be approved as enclosed channel for electrical conductors. (CMP-8)

**Raceway, Communications. (Communications Raceway)**

An enclosed channel of nonmetallic materials designed expressly for holding communications wires and cables; optical fiber cables; data cables associated with information technology and communications equipment; Class 2, Class 3, and Type PLTC cables; and power-limited fire alarm cables in plenum, riser, and general-purpose applications. (CMP-16)

**Raceway, Strut-Type Channel. (Strut-Type Channel Raceway)**

A metal raceway that is intended to be mounted to the surface of or suspended from a structure, with associated accessories for the installation of electrical conductors and cables. (CMP-8)

**Raceway, Surface Metal. (Surface Metal Raceway)**

A metal raceway that is intended to be mounted to the surface of a structure, with associated couplings, connectors, boxes, and fittings for the installation of electrical conductors. (CMP-8)

**Raceway, Surface Nonmetallic. (Surface Nonmetallic Raceway)**

A nonmetallic raceway that is intended to be mounted to the surface of a structure, with associated couplings, connectors, boxes, and fittings for the installation of electrical conductors. (CMP-8)

**Raceway, Underfloor. (Underfloor Raceway)**

A raceway and associated components designed and intended for installation beneath or flush with the surface of a floor for the installation of cables and electrical conductors. (CMP-8)

**Rail.**

The structural support for the suspended ceiling system typically forming the ceiling grid supporting the ceiling tile and listed utilization equipment, such as sensors, actuators, A/V devices, and low-voltage luminaires and similar electrical equipment. (393) (CMP-18)

**Rainproof.**

Constructed, protected, or treated so as to prevent rain from interfering with the successful operation of the apparatus under specified test conditions. (CMP-1)

**Raintight.**

Constructed or protected so that exposure to a beating rain will not result in the entrance of water under specified test conditions. (CMP-1)

**Rated-Load Current (RLC).**

The current of a hermetic refrigerant motor-compressor resulting when it is operated at the rated load, rated voltage, and rated frequency of the equipment it serves. (440) (CMP-11)

**Rated Output Power.**

The amplifier manufacturer's stated or marked output power capability into its rated load. (640) (CMP-12)

**Rated Power.**

The output power of a wind turbine at its rated wind speed. (694) (CMP-4)

Informational Note: See IEC 61400-12-1, *Power Performance Measurements of Electricity Producing Wind Turbines*, for the method for measuring wind turbine power output.

**Receptacle.**

A contact device installed at the outlet for the connection of an attachment plug, or for the direct connection of electrical utilization equipment designed to mate with the corresponding contact device. A single receptacle is a single contact device with no other contact device on the same yoke or strap. A multiple receptacle is two or more contact devices on the same yoke or strap. (CMP-18)

Informational Note: A duplex receptacle is an example of a multiple receptacle that has two receptacles on the same yoke or strap.

**Receptacle, Weight-Supporting Ceiling (WSCR), (Weight-Supporting Ceiling Receptacle)**

A contact device installed at an outlet box for the connection and support of luminaries or ceiling-suspended (paddle) fans using a weight-supporting attachment fitting (WSAF). (CMP-18)

Informational Note: See ANSI/NEMA WD 6, *American National Standard for Wiring Devices — Dimensional Specifications*, for the standard configuration of weight-supporting ceiling receptacles and related weight-supporting attachment fittings.

**Receptacle Outlet.**

An outlet where one or more receptacles are installed. (CMP-18)

**Reconditioned.**

Electromechanical systems, equipment, apparatus, or components that are restored to operating conditions. This process differs from normal servicing of equipment that remains within a facility, or replacement of listed equipment on a one-to-one basis. (CMP-1)

Informational Note: The term *reconditioned* is frequently referred to as *rebuilt*, *refurbished*, or *remanufactured*.

**Recreational Vehicle (RV) (Camping Trailer) (Motor Home) (Travel Trailer) (Truck Camper).**

A vehicle or slide-in camper that is primarily designed as temporary living quarters for recreational, camping, or seasonal use; has its own motive power or is mounted on or towed by another vehicle; is regulated by the National Highway Traffic Safety Administration as a vehicle or vehicle equipment; does not require a special highway use permit for operation on the highways; and can be easily transported and set up on a daily basis by an individual. [ 1192: 3.3.52] (551) (CMP-7)

Informational Note: See NFPA 1192, *Standard on Recreational Vehicles*, Informative Annex A, for product types and definitions for motor homes and towable recreational vehicles.

**Recreational Vehicle Park.**

Any parcel or tract of land under the control of any person, organization, or governmental entity wherein two or more recreational vehicle, recreational park trailer, and/or other camping sites are offered for use by the public or members of an organization for overnight stays. (551) (CMP-7)

**Recreational Vehicle Site.**

A specific area within a recreational vehicle park or campground that is set aside for use by a camping unit. (551) (CMP-7)

**Recreational Vehicle Site Supply Equipment.**

A power outlet assembly located near the point of entrance of supply conductors to a recreational vehicle site and intended to constitute the disconnecting means for connected recreational vehicles. (551) (CMP-7)

**Recreational Vehicle Stand.**

That area of a recreational vehicle site intended for the placement of a recreational vehicle. (551) (CMP-7)

**Reference Grounding Point.**

The ground bus of the panelboard or isolated power system panel supplying the patient care room. [ 99: 3.3.158] (517) (CMP-15)

**Relative Analgesia.**

A state of sedation and partial block of pain perception produced in a patient by the inhalation of concentrations of nitrous oxide insufficient to produce loss of consciousness (conscious sedation). (517) (CMP-15)

**Relay, Automatic Load Control. (Automatic Load Control Relay)**

An emergency lighting control device used to set normally dimmed or normally-off switched emergency lighting equipment to full power illumination levels in the event of a loss of the normal supply by bypassing the dimming/switching controls, and to return the emergency lighting equipment to normal status when the device senses the normal supply has been restored. (700) (CMP-13)

Informational Note: See ANSI/UL 924, *Emergency Lighting and Power Equipment*, for the requirements covering automatic load control relays.

**Remote-Control Circuit.**

Any electrical circuit that controls any other circuit through a relay or an equivalent device. (CMP-3)

**Remote Disconnect Control.**

An electric device and circuit that controls a disconnecting means through a relay or equivalent device. (645) (CMP-12)

**Resistance Heating Element.**

A specific separate element to generate heat that is stand-alone, externally attached to, embedded in, integrated with, or internal to the object to be heated. (CMP-17)

Informational Note: Tubular heaters, strip heaters, heating cable, heating tape, heating blankets, immersion heaters, and heating panels are examples of resistance heaters.

**Restricted Industrial Establishment [as applied to hazardous (classified) locations].**

Establishment with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation. (CMP-14)

**Retrofit Kit.**

A complete subassembly of parts and devices for field conversion of utilization equipment. (CMP-18)

**Retrofit Kit, General Use. (General Use Retrofit Kit)**

A kit consisting of primary parts, which does not include all the parts for a complete subassembly but includes a list of required parts and installation instructions to complete the subassembly in the field. (600) (CMP-18)

**Retrofit Kit, Sign Specific. (Sign Specific Retrofit Kit)**

A kit consisting of the necessary parts and hardware to allow for field installation in a host sign, based on the included installation instructions. (600) (CMP-18)

**Reverse Polarity Protection (Backfeed Protection).**

A system that prevents two interconnected power supplies, connected positive to negative, from passing current from one power source into a second power source. (393) (CMP-18)

**Ride Device.**

A device or combination of devices that carry, convey, or direct a person(s) over or through a fixed or restricted course within a defined area for the primary purpose of amusement or entertainment. (522) (CMP-15)

**Riser Cable, Cable Routing Assemblies, and Raceways.**

Cables, cable routing assemblies, and raceways that have fire-resistant characteristics capable of preventing the carrying of fire from floor to floor and are suitable for use in a vertical run in a shaft or from floor to floor. (722) (CMP-3)

**Safe Zone.**

Low probability of damage other than a slight swelling of the capacitor case, as identified by the case rupture curve of the capacitor. (460) (CMP-11)



**Safety Circuit.**

The part of a control system containing one or more devices that perform a safety-related function. [ 79: 3.3.95] (CMP-12)

Informational Note: See NFPA 79-2021, *Electrical Standard for Industrial Machinery*. *Safety-related control system* and *safety interlock circuit* are common terms that can be used to refer to the safety circuit in other standards. The safety circuit can include hard-wired, communication, and software-related components.

**Sealable Equipment.**

Equipment enclosed in a case or cabinet that is provided with a means of sealing or locking so that live parts cannot be made accessible without opening the enclosure. (CMP-1)

Informational Note: The equipment may or may not be operable without opening the enclosure.

**Sealed [as applied to hazardous (classified) locations].**

Constructed such that equipment is sealed effectively against entry of an external atmosphere and is not opened during normal operation or for any maintenance activities. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Sealed, Hermetically. (Hermetically Sealed)**

Sealed against the entrance of an external atmosphere, such that the seal is made by fusion of metal to metal, ceramic to metal, or glass to metal. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Section Sign.**

A sign or outline lighting system, shipped as subassemblies, that requires field-installed wiring between the subassemblies to complete the overall sign. The subassemblies are either physically joined to form a single sign unit or are installed as separate remote parts of an overall sign. (600) (CMP-18)

**Selected Receptacles.**

A minimal number of receptacles selected by the health care facility's governing body as necessary to provide essential patient care and facility services during loss of normal power. [ 99: 3.3.164] (517) (CMP-15)

**Self-Contained Therapeutic Tubs or Hydrotherapeutic Tanks.**

A factory-fabricated unit consisting of a therapeutic tub or hydrotherapeutic tank with all water-circulating, heating, and control equipment integral to the unit. Equipment may include pumps, air blowers, heaters, light controls, sanitizer generators, and so forth. (680) (CMP-17)

**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 transport refrigerated unit (TRU) flanged surface inlet. (626) (CMP-12)

**Separately Derived System.**

An electrical power supply output, other than a service, having no direct connection(s) to circuit conductors of any other electrical source other than those established by grounding and bonding connections. (CMP-5)



**Service.**

The conductors and equipment connecting the serving utility to the wiring system of the premises served. (CMP-10)

**Service Conductors.**

The conductors from the service point to the service disconnecting means. (CMP-10)

**Service Conductors, Overhead. (Overhead Service Conductors)**

The overhead conductors between the service point and the first point of connection to the service-entrance conductors at the building or other structure. (CMP-10)

**Service Conductors, Underground. (Underground Service Conductors)**

The underground conductors between the service point and the first point of connection to the service-entrance conductors in a terminal box, meter, or other enclosure, inside or outside the building wall. (CMP-10)

Informational Note: Where there is no terminal box, meter, or other enclosure, the point of connection is considered to be the point of entrance of the service conductors into the building.

**Service Drop.**

The overhead conductors between the serving utility and the service point. (CMP-10)

**Service-Entrance Conductor Assembly.**

Multiple single-insulated conductors twisted together without an overall covering, other than an optional binder intended only to keep the conductors together. (CMP-6)

**Service-Entrance Conductors.**

The service conductors between the terminals of the service equipment to the service drop, overhead service conductors, service lateral, or underground service conductors. (CMP-10)

Informational Note: Where service equipment is located outside the building walls, there could be no service-entrance conductors or they might be entirely outside the building.

**Service Equipment.**

The necessary equipment, consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the serving utility and intended to constitute the main control and disconnect of the serving utility. (CMP-10)

**Service Equipment, Mobile Home. (Mobile Home Service Equipment)**

The equipment containing the disconnecting means, overcurrent protective devices, and receptacles or other means for connecting a mobile home feeder assembly. (550) (CMP-7)

**Service Lateral.**

The underground conductors between the utility electric supply system and the service point. (CMP-10)

**Service Point.**

The point of connection between the facilities of the serving utility and the premises wiring. (CMP-10)

Informational Note: The service point can be described as the point of demarcation between where the serving utility ends and the premises wiring begins. The serving utility generally specifies the location of the service point based on the conditions of service.

**Servicing.**

The process of following a manufacturer's set of instructions or applicable industry standards to analyze, adjust, or perform prescribed actions upon equipment with the intention to preserve or restore the operational performance of the equipment. (CMP-1)

Informational Note: Servicing often encompasses maintenance and repair activities.

**Shore Power.**

The electrical equipment required to power a floating vessel including, but not limited to, the receptacle and cords. (555) (CMP-7)

**Shoreline.**

The farthest extent of standing water under the applicable conditions that determine the electrical datum plane for the specified body of water. (682) (CMP-17)

**Short Circuit.**

An abnormal connection (including an arc) of relatively low impedance, whether made accidentally or intentionally, between two or more points of different potential. (CMP-10)

**Short-Circuit Current Rating.**

The prospective symmetrical fault current at a nominal voltage to which an apparatus or system is able to be connected without sustaining damage exceeding defined acceptance criteria. (CMP-10)

**Show Window.**

Any window, including windows above doors, used or designed to be used for the display of goods or advertising material, whether it is fully or partly enclosed or entirely open at the rear and whether or not it has a platform raised higher than the street floor level. (CMP-2)

**Sign, Photovoltaic (PV) Powered (PV Powered Sign). [Photovoltaic (PV) Powered Sign]**

A complete sign powered by solar energy consisting of all components and subassemblies for installation either as an off-grid stand-alone, on-grid interactive, or non-grid interactive system. (600) (CMP-18)

**Sign Body.**

A portion of a sign that may provide protection from the weather but is not an electrical enclosure. (600) (CMP-18)

**Signaling Circuit.**

Any electrical circuit that energizes signaling equipment. (CMP-3)

**Simple Apparatus.**

An electrical component or combination of components of simple construction with well-defined electrical parameters that does not generate more than 1.5 volts, 100 mA, and 25 mW, or a passive component that does not dissipate more than 1.3 watts and is compatible with the intrinsic safety of the circuit in which it is used. (CMP-14)

Informational Note No. 1: The following are examples of simple apparatus:

- (1) Passive components; for example, switches, instrument connectors, plugs and sockets, junction boxes, resistance temperature devices, and simple semiconductor devices such as LEDs
- (2) Sources of stored energy consisting of single components in simple circuits with well-defined parameters; for example, capacitors or inductors, whose values are considered when determining the overall safety of the system
- (3) Sources of generated energy; for example, thermocouples and photocells, that do not generate more than 1.5 volts, 100 mA, and 25 mW

Informational Note No. 2: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*, and ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”*, for additional information.

**Single-Pole Separable Connector.**

A device that is installed at the ends of portable, flexible, single-conductor cable that is used to establish connection or disconnection between two cables or one cable and a single-pole, panel-mounted separable connector. (CMP-18)

**Site-Isolating Device.**

A pole-mounted disconnecting means installed at the distribution point for the purposes of isolation, system maintenance, emergency disconnection, or connection of optional standby systems. (547) (CMP-7)

**Skeleton Tubing.**

Neon tubing that is itself the sign or outline lighting and is not attached to an enclosure or sign body. (600) (CMP-18)

**Slip.**

A berthing space between or adjacent to piers, wharves, or docks; the water areas associated with boat occupation. [ 303: 3.3.21] (555) (CMP-7)

Informational Note: See the definition of *Berth* for additional information.

**Solid-State Phase-Control Dimmer.**

A solid-state dimmer where the wave shape of the steady-state current does not follow the wave shape of the applied voltage such that the wave shape is nonlinear. (CMP-15)

**Solid-State Sine Wave Dimmer.**

A solid-state dimmer where the wave shape of the steady-state current follows the wave shape of the applied voltage such that the wave shape is linear. (CMP-15)

**Spa or Hot Tub.**

A hydromassage pool, or tub for recreational or therapeutic use, not located in health care facilities, designed for immersion of users, and usually having a filter, heater, and motor-driven blower. It may be installed indoors or outdoors, on the ground or supporting structure, or in the ground or supporting structure. Generally, they are not designed or intended to have its contents drained or discharged after each use. (680) (CMP-17)

**Spa or Hot Tub, Packaged Equipment Assembly. (Packaged Spa or Hot Tub Equipment Assembly)**

A factory-fabricated unit consisting of water-circulating, heating, and control equipment mounted on a common base, intended to operate a spa or hot tub. Equipment can include pumps, air blowers, heaters, lights, controls, sanitizer generators, and so forth. (680) (CMP-17)

**Spa or Hot Tub, Self-Contained. (Self-Contained Spa or Hot Tub)**

Factory-fabricated unit consisting of a spa or hot tub vessel with all water-circulating, heating, and control equipment integral to the unit. Equipment can include pumps, air blowers, heaters, lights, controls, sanitizer generators, and so forth. (680) (CMP-17)

**Spa or Hot Tub, Storable. (Storable Spa or Hot Tub)**

Spas or hot tubs installed entirely on or above the ground that are intended to be stored when not in use and are designed for ease of relocation. (680) (CMP-17)

**Space.**

A portion of the health care facility designated by the health care facility's governing body that serves a specific purpose. [ 99: 3.3.171] (517) (CMP-15)

**Special Permission.**

The written consent of the authority having jurisdiction. (CMP-1)

**Special Protection “s”.**

Type of protection that permits design, assessment, and testing of equipment that cannot be fully assessed within a recognized type of protection or combination of recognized types of protection because of functional or operational limitations, but that can be demonstrated to provide the necessary equipment protection level (EPL). (CMP-14)

Informational Note: See ANSI/UL 60079-33, *Explosive Atmospheres — Part 33: Equipment Protection by Special Protection “s”*, for additional information.

**Special-Purpose Multi-Circuit Cable System.**

A portable branch-circuit distribution system consisting of one or more trunk cables and optional breakout assemblies or multi-circuit outlet enclosures. (520) (CMP-15)

**Spider (Cable Splicing Block).**

A device that contains busbars that are insulated from each other for the purpose of splicing or distributing power to portable cables and cords that are terminated with single-pole busbar connectors. (530) (CMP-15)

**Spin Down.**

A shutdown condition of the FESS, where energy is being dissipated and the flywheel rotor is slowing down to a stop. (706) (CMP-13)

Informational Note: A complete stop of a flywheel rotor cannot occur instantaneously because of the high kinetic energy of the rotor, but rather occurs over time as a result of friction forces acting on the rotor.

**Splash Pad.**

A fountain intended for recreational use by pedestrians and designed to contain no more than 25 mm (1 in.) of water depth. This definition does not include showers intended for hygienic rinsing prior to use of a pool, spa, or other water feature. (680) (CMP-17)

**Spray Area.**

Any fully enclosed, partly enclosed, or unenclosed area in which flammable or combustible vapors, mists, residues, dusts, or deposits are present due to the operation of spray processes, including:

- (1) any area in the direct path of a spray application process;
- (2) the interior of a spray booth, spray room, or limited finishing workstation, as herein defined;
- (3) the interior of any exhaust plenum, eliminator section, or scrubber section;
- (4) the interior of any exhaust duct or exhaust stack leading from a spray application process;
- (5) the interior of any air recirculation path up to and including recirculation particulate filters;
- (6) any solvent concentrator (pollution abatement) unit or solvent recovery (distillation) unit; and
- (7) the inside of a membrane enclosure.

The following are not part of the spray area:

- (1) fresh air make-up units;
- (2) air supply ducts and air supply plenums;
- (3) recirculation air supply ducts downstream of recirculation particulate filters; and
- (4) exhaust ducts from solvent concentrator (pollution abatement) units. [ **33**: 3.3.2.3] (CMP-14)

Informational Note No. 1: Unenclosed spray areas are locations outside of buildings or are localized operations within a larger room or space. Such areas are normally provided with some local vapor extraction/ventilation system. In automated operations, the area limits are the maximum area in the direct path of spray operations. In manual operations, the area limits are the maximum area of spray when aimed at 90 degrees to the application surface.

Informational Note No. 2: See definitions for *limited finishing workstation* and *membrane enclosure* for additional information.

**Spray Area, Outdoor. (Outdoor Spray Area)**

A spray area that is outside the confines of a building or that has a canopy or roof that does not limit the dissipation of the heat of a fire or dispersion of flammable vapors and does not restrict fire-fighting access and control. For the purpose of this standard, an outdoor spray area can be treated as an unenclosed spray area as defined in this *Code*. [ **33**: 3.3.2.3.1] (CMP-14)

**Spray Area, Unenclosed. (Unenclosed Spray Area)**

Any spray area that is not confined by a limited finishing workstation, spray booth, or spray room, as herein defined. [ **33**: 3.3.2.3.2] (CMP-14)

**Spray Booth.**

A power-ventilated enclosure for a spray application operation or process that confines and limits the escape of the material being sprayed, including vapors, mists, dusts, and residues that are produced by the spraying operation and conducts or directs these materials to an exhaust system. [ **33**: 3.3.19] (CMP-14)

Informational Note: A spray booth is an enclosure or insert within a larger room used for spraying, coating, and/or dipping applications. A spray booth can be fully enclosed or have open front or face and can include a separate conveyor entrance and exit. The spray booth is provided with a dedicated ventilation exhaust with supply air from the larger room or from a dedicated air supply.

**Spray Room.**

A power-ventilated fully enclosed room with a specified fire resistance rating used exclusively for open spraying of flammable or combustible materials. [ **33:** 3.3.20] (CMP-14)

**Stage Effect (Special Effect).**

An electrical or electromechanical piece of equipment used to simulate a distinctive visual or audible effect, such as a wind machine, lightning simulator, or sunset projector. (CMP-15)

**Stage Equipment.**

Equipment at any location on the premises integral to the stage production including, but not limited to, equipment for lighting, audio, special effects, rigging, motion control, projection, or video. (520) (CMP-15)

**Stage Lighting Hoist.**

A motorized lifting device that contains a mounting position for one or more luminaires, with wiring devices for connection of luminaires to branch circuits, and integral flexible cables to allow the luminaires to travel over the lifting range of the hoist while energized. (520) (CMP-15)

**Stage Property.**

An article or object used as a visual element in a motion picture or television production, except painted backgrounds (scenery) and costumes. (530) (CMP-15)

**Stage Set.**

A specific area set up with temporary scenery and properties designed and arranged for a particular scene in a motion picture or television production. (CMP-15)

**Stage Switchboard, Fixed. (Fixed Stage Switchboard)**

A permanently installed switchboard, panelboard, or rack containing dimmers or relays with associated overcurrent protective devices, or overcurrent protective devices alone, used primarily to feed stage equipment. (CMP-15)

**Stage Switchboard, Portable. (Portable Stage Switchboard)**

A portable rack or pack containing dimmers or relays with associated overcurrent protective devices, or overcurrent protective devices alone, used to feed stage equipment. (520) (CMP-15)

**Stand Lamp.**

A portable stand that contains a general-purpose luminaire or lampholder with guard for the purpose of providing general illumination on a stage, in an auditorium, or in a studio. (520) (CMP-15)

**Stand-Alone System.**

A system that is not connected to an electric power production and distribution network. (CMP-4)

**Stationary (as applied to equipment).**

Equipment that is not moved from one place to another in normal use. (680) (CMP-17)

**Storage, Dry Stack. (Dry Stack Storage)**

A facility, either covered or uncovered, constructed of horizontal and vertical structural members designed to allow placement of small boats in defined slots arranged both horizontally and vertically. [ **303:** 3.3.24.2] (555) (CMP-7)

**Stored-Energy Power Supply System (SEPSS).**

A complete functioning EPSS powered by a stored-energy electrical source. (CMP-13)

**Stranding, Compact. (Compact Stranding)**

A conductor stranding method in which each layer of strands is pressed together to minimize the gaps between the strands so the overall diameter of the finished conductor is less than a concentric stranded conductor and less than a compressed stranded conductor. (CMP-6)

**Stranding, Compressed. (Compressed Stranding)**

A conductor stranding method in which the outer layer of strands is pressed together so the overall diameter of the finished conductor is less than a concentric stranded conductor but greater than a compact stranded conductor. (CMP-6)

**Stranding, Concentric. (Concentric Stranding)**

A conductor consisting of a straight central strand surrounded by one or more layers of strands, helically laid in a geometric pattern. (CMP-6)

**Strip Light.**

A luminaire with multiple lamps arranged in a row. (520) (CMP-15)

**Structure.**

That which is built or constructed, other than equipment. (CMP-1)

**Structure, Relocatable. (Relocatable Structure)**

A factory-assembled structure or structures transportable in one or more sections that are built on a permanent chassis and designed to be used as other than a dwelling unit without a permanent foundation. (545) (CMP-7)

Informational Note: Examples of relocatable structures are those units that are equipped for sleeping purposes only, contractor's and other on-site offices, construction job dormitories, studio dressing rooms, banks, clinics, stores, shower facilities and restrooms, training centers, or for the display or demonstration of merchandise or machines.

**Subassembly.**

Component parts or a segment of a sign, retrofit kit, or outline lighting system that, when assembled, forms a complete unit or product. (600) (CMP-18)

**Substation.**

An assemblage of equipment (e.g., switches, interrupting devices, circuit breakers, buses, and transformers) through which electric energy is passed for the purpose of distribution, switching, or modifying its characteristics. (CMP-9)

**Supervisory Control and Data Acquisition (SCADA).**

An electronic system that provides monitoring and controls for the operation of the critical operations power system. (CMP-13)

Informational Note: This can include the fire alarm system, security system, control of the HVAC, the start/stop/monitoring of the power supplies and electrical distribution system, annunciation and communications equipment to emergency personnel, facility occupants, and remote operators.

**Support Areas.**

Areas, other than fixed production offices, intended to support production and where image capture will not take place. Such areas include, but are not limited to, mobile production offices, storage, and workspaces; vehicles and trailers for cast, makeup, hair, lighting, grip, wardrobe, props, catering, and craft services; and portable restrooms. (530) (CMP-15)

**Surge Arrester.**

A protective device for limiting surge voltages by discharging or bypassing surge current; it also prevents continued flow of follow current while remaining capable of repeating these functions. (CMP-10)



**Surge-Protective Device (SPD).**

A protective device for limiting transient voltages by diverting or limiting surge current; it also prevents continued flow of follow current while remaining capable of repeating these functions and is designated as follows:

- (1) Type 1: Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service disconnect overcurrent device
- (2) Type 2: Permanently connected SPDs intended for installation on the load side of the service disconnect overcurrent device, including SPDs located at the branch panel
- (3) Type 3: Point of utilization SPDs
- (4) Type 4: Component SPDs, including discrete components, as well as assemblies. (CMP-10)

Informational Note: See UL 1449, *Standard for Surge Protective Devices*, for further information on SPDs.

**Suspended Ceiling Grid.**

A system that serves as a support for a finished ceiling surface and other utilization equipment. (393) (CMP-18)

**Switch, General-Use. (General-Use Switch)**

A switch intended for use in general distribution and branch circuits. It is rated in amperes, and it is capable of interrupting its rated current at its rated voltage. (CMP-9)

**Switch, General-Use Snap. (General-Use Snap Switch)**

A form of general-use switch constructed so that it can be installed in device boxes or on box covers, or otherwise used in conjunction with wiring systems recognized by this Code. (CMP-9)

**Switch, Isolating. (Isolating Switch)**

A switch intended for isolating an electrical circuit from the source of power. It has no interrupting rating, and it is intended to be operated only after the circuit has been opened by some other means. (CMP-9)

**Switch, Motor-Circuit. (Motor-Circuit Switch)**

A switch rated in horsepower that is capable of interrupting the maximum operating overload current of a motor of the same horsepower rating as the switch at the rated voltage. (CMP-11)

**Switchboard.**

A large single panel, frame, or assembly of panels on which are mounted on the face, back, or both, switches, overcurrent and other protective devices, buses, and usually instruments. (CMP-9)

Informational Note: These assemblies can be accessible from the rear or side as well as from the front and are not intended to be installed in cabinets.

**Switchgear.**

An assembly completely enclosed on all sides and top with sheet metal (except for ventilating openings and inspection windows) and containing primary power circuit switching, interrupting devices, or both, with buses and connections. The assembly may include control and auxiliary devices. Access to the interior of the enclosure is provided by doors, removable covers, or both. (CMP-9)

Informational Note: All switchgear subject to NEC requirements is metal enclosed. Switchgear rated below 1000 V or less may be identified as "low-voltage power circuit breaker switchgear." Switchgear rated over 1000 V may be identified as "metal-enclosed switchgear" or "metal-clad switchgear." Switchgear is available in non-arc-resistant or arc-resistant constructions.

**Switching Device(as applied to equipment rated over 1000 volts ac, 1500 volts dc, nominal).**

A device designed to close, open, or both, one or more electrical circuits. (CMP-9)

**Cutout.**

An assembly of a fuse support with either a fuseholder, fuse carrier, or disconnecting blade. The fuseholder or fuse carrier may include a conducting element (fuse link) or may act as the disconnecting blade by the inclusion of a nonfusible member.

**Disconnecting Switch (or Isolating Switch).**

A mechanical switching device used for isolating a circuit or equipment from a source of power.

**Interrupter Switch.**

A switching device capable of making, carrying, and interrupting specified currents.

**Oil-Filled Cutout.**

A cutout in which all or part of the fuse support and its fuse link or disconnecting blade is mounted in oil with complete immersion of the contacts and the fusible portion of the conducting element (fuse link) so that arc interruption by severing of the fuse link or by opening of the contacts will occur under oil.

**Oil Switch.**

A switching device having contacts that operate under oil (or askarel or other suitable liquid).

**Regulator Bypass Switch.**

A switching device or combination of switching devices designed to bypass equipment used to control voltage levels or related circuit characteristics.

**System Isolation Equipment.**

A redundantly monitored, remotely operated contactor-isolating system, packaged to provide the disconnection/isolation function, capable of verifiable operation from multiple remote locations by means of lockout switches, each having the capability of being padlocked in the "off" (open) position. (430) (CMP-11)

**Tap Conductor.**

A conductor, other than a service conductor, that has overcurrent protection ahead of its point of supply that exceeds the value permitted for similar conductors that are protected as described elsewhere in 240.4. (240) (CMP-10)

**Task Illumination.**

Provisions for the minimum lighting required to carry out necessary tasks in the areas described in 517.34(A), including safe access to supplies and equipment and access to exits. [ 99: 3.3.177] (517) (CMP-15)

**Technical Power System.**

An electrical distribution system 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. (640) (CMP-12)

**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. (640) (CMP-12)

**Terminal (as applied to batteries).**

That part of a cell, container, or battery to which an external connection is made (commonly identified as post, pillar, pole, or terminal post). (CMP-13)

**Thermal Protector (as applied to motors).**

A protective device for assembly as an integral part of a motor or motor-compressor that, when properly applied, protects the motor against dangerous overheating due to overload and failure to start. (CMP-11)

Informational Note: The thermal protector may consist of one or more sensing elements integral with the motor or motor-compressor and an external control device.

**Thermal Resistivity.**

The heat transfer capability through a substance by conduction. (CMP-6)

Informational Note: Thermal resistivity is the reciprocal of thermal conductivity and is designated  $\rho$ , which is expressed in the units °C-cm/W.

**Thermally Protected (as applied to motors).**

A motor or motor-compressor that is provided with a thermal protector. (CMP-11)

**Top Shield.**

A grounded metal shield covering under-carpet components of the flat conductor cable (Type FCC) system for the purposes of providing protection against physical damage. (324) (CMP-6)

**Tower.**

A pole or other structure that supports a wind turbine. (694) (CMP-4)

**Transfer Switch.**

An automatic or nonautomatic device for transferring one or more load conductor connections from one power source to another. (CMP-13)

**Transfer Switch, Branch-Circuit Emergency Lighting. (Branch-Circuit Emergency Lighting Transfer Switch)**

A device connected on the load side of a branch-circuit overcurrent protective device that transfers only emergency lighting loads from the normal power source to an emergency power source. (700) (CMP-13)

Informational Note: See ANSI/UL 1008, *Transfer Switch Equipment*, for information covering branch-circuit emergency lighting transfer switches.

**Transfer Switch, Bypass Isolation. (Bypass Isolation Transfer Switch)**

A manual, nonautomatic, or automatic operated device used in conjunction with a transfer switch to provide a means of directly connecting load conductors to a power source and of disconnecting the transfer switch. (CMP-13)

**Transfer Switch, Meter-Mounted. (Meter-Mounted Transfer Switch)**

A transfer switch connected between the utility meter and the meter base. (CMP-13)

Informational Note: Meter-mounted transfer switches can plug into the meter base. Transfer switches that incorporate the meter base in the transfer equipment assembly are not considered meter-mounted transfer switches.

**Transformer.**

Equipment, either single-phase or polyphase, that uses electromagnetic induction to convert current and voltage in a primary circuit into current and voltage in a secondary circuit. (CMP-9)

**Transition Assembly.**

An assembly to facilitate connection of the flat conductor cable (Type FCC) system to other wiring systems, incorporating (1) a means of electrical interconnection and (2) a suitable box or covering for providing electrical safety and protection against physical damage. (324) (CMP-6)

**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. (626) (CMP-12)

**Transportable.**

X-ray equipment that is to be installed in a vehicle or that may be readily disassembled for transport in a vehicle. (660) (CMP-12)

**Truck.**

A motor vehicle designed for the transportation of goods, services, and equipment. (626) (CMP-12)

**Truck Coupler.**

A truck flanged surface inlet and mating cord connector. (626) (CMP-12)

**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. (626) (CMP-12)

**Trunk Cable.**

A portable extension cable containing six or more branch circuits, a male multipole plug, and a female multipole receptacle. (520) (CMP-15)

**Tubing, Electrical Metallic (EMT). (Electrical Metallic Tubing)**

An unthreaded thinwall 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 utilizing appropriate fittings. (CMP-8)

**Tubing, Electrical Nonmetallic (ENT). (Electrical Nonmetallic Tubing)**

A nonmetallic, pliable, corrugated raceway of circular cross section with integral or associated couplings, connectors, and fittings for the installation of electrical conductors. It is composed of a material that is resistant to moisture and chemical atmospheres and is flame retardant.

A pliable raceway is a raceway that can be bent by hand with a reasonable force but without other assistance. (CMP-8)

**Tubing, Flexible Metallic (FMT). (Flexible Metallic Tubing)**

A metal raceway that is circular in cross section, flexible, and liquidtight without a nonmetallic jacket. (CMP-8)

**Two-Fer.**

An assembly containing one male plug and two female cord connectors used to connect two loads to one branch circuit. (520) (CMP-15)

**Type of Protection “n”.**

Type of protection where electrical equipment, in normal operation, is not capable of igniting a surrounding explosive gas atmosphere and a fault capable of causing ignition is not likely to occur. (CMP-14)

Informational Note: See ANSI/UL 60079-15, *Explosive Atmospheres — Part 15: Equipment Protection by Type of Protection “n”*, for additional information.

**Ungrounded.**

Not connected to ground or to a conductive body that extends the ground connection. (CMP-5)

**Uninterruptible Power Supply (UPS).**

A device or system that provides quality and continuity of ac power through the use of a stored-energy device as the backup power source for a period of time when the normal power supply is incapable of performing acceptably. (CMP-13)

**Unit Equipment.**

A battery-equipped emergency luminaire that illuminates only as part of the emergency illumination system and is not illuminated when the normal supply is available. (CMP-13)

**Utilization Equipment.**

Equipment that utilizes electric energy for electronic, electromechanical, chemical, heating, lighting, or similar purposes. (CMP-1)

**Valve Actuator Motor (VAM) Assemblies.**

A manufactured assembly, used to operate a valve, consisting of an actuator motor and other components such as motor controllers, torque switches, limit switches, and overload protection. (430) (CMP-11)

Informational Note: VAMs typically have short-time duty and high-torque characteristics.

**Ventilated.**

Provided with a means to permit circulation of air sufficient to remove an excess of heat, fumes, or vapors. (CMP-14)

**Vessel.**

A container such as a barrel, drum, or tank for holding fluids or other material. (CMP-17)

**Volatile Flammable Liquid.**

A flammable liquid having a flash point below 38°C (100°F), or a flammable liquid whose temperature is above its flash point, or a Class II combustible liquid that has a vapor pressure not exceeding 276 kPa (40 psia) at 38°C (100°F) and whose temperature is above its flash point. (CMP-14)

**Voltage (of a circuit).**

The greatest root-mean-square (rms) (effective) difference of potential between any two conductors of the circuit concerned. (CMP-1)

Informational Note: Some systems, such as 3-phase 4-wire, single-phase 3-wire, and 3-wire direct current, may have various circuits of various voltages.

**Voltage, High. (High Voltage)**

A potential difference of more than 1000 volts, nominal. (CMP-9)

Informational Note: Circuits and equipment rated at potential differences of more than 1000 volts and up to 52 kV are also commonly referred to as medium voltage.

**Voltage, Low. (Low Voltage).**

An electromotive force rated 24 volts, nominal, or less. (551) (CMP-7)

**Voltage, Nominal. (Nominal Voltage)**

A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (e.g., 120/240 volts, 480Y/277 volts, 600 volts). (CMP-1)

Informational Note No. 1: The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of equipment.

Informational Note No. 2: See ANSI C84.1-2011, *Voltage Ratings for Electric Power Systems and Equipment* (60 Hz).

**Voltage, Nominal (as applied to battery or cell).(Nominal Voltage)**

The value assigned to a cell or battery of a given voltage class for the purpose of convenient designation. The operating voltage of the cell or battery may vary above or below this value. (CMP-13)

Informational Note: The most common nominal cell voltages are 2 volts per cell for the lead-acid batteries, 1.2 volts per cell for alkali batteries, and 3.2 to 3.8 volts per cell for Li-ion batteries. Nominal voltages might vary with different chemistries.

**Voltage to Ground.**

For grounded circuits, the voltage between the given conductor and that point or conductor of the circuit that is grounded; for ungrounded circuits, the greatest voltage between the given conductor and any other conductor of the circuit. (CMP-1)

**Watertight.**

Constructed so that moisture will not enter the enclosure under specified test conditions. (CMP-1)

**Weatherproof.**

Constructed or protected so that exposure to the weather will not interfere with successful operation. (CMP-1)

Informational Note: Rainproof, raintight, or watertight equipment can fulfill the requirements for weatherproof where varying weather conditions other than wetness, such as snow, ice, dust, or temperature extremes, are not a factor.

**Wharf.**

A structure at the shoreline that has a platform built along and parallel to a body of water with either an open deck or a superstructure. [ 307: 3.3.28] (555) (CMP-7)

**Wind Turbine.**

A mechanical device that converts wind energy to electrical energy. (CMP-4)

**Wind Turbine Output Circuit. (Turbine Output Circuit)**

The circuit conductors between the internal components of a wind turbine (which might include an alternator, integrated rectifier, controller, and/or inverter) and other equipment. (694) (CMP-4)

**Wire.**

A factory assembly of one or more insulated conductors without an overall covering. (805) (CMP-16)

**Wireless Power Transfer (WPT).**

The transfer of electrical energy from a power source to an electrical load via magnetic fields by a contactless means between a primary device and a secondary device. (625) (CMP-12)

**Wireless Power Transfer Equipment (WPTE).**

Equipment installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle without physical electrical contact. (625) (CMP-12)

Informational Note No. 1: The general form of WPTE consists of two physical packages: a control box and a primary pad.

Informational Note No. 2: Electric vehicle power export equipment and wireless power transfer equipment are sometimes contained in one set of equipment, sometimes referred to as a bidirectional WPTE.

**Wireways, Metal. (Metal Wireways)**

Sheet metal troughs with hinged or removable covers for housing and protecting electrical wires and cable and in which conductors are laid in place after the raceway has been installed as a complete system. (CMP-8)



**Wireways, Nonmetallic. (Nonmetallic Wireways)**

Flame-retardant, nonmetallic troughs with removable covers for housing and protecting electrical wires and cables in which conductors are laid in place after the raceway has been installed as a complete system. (CMP-8)

**Work Surface.**

A fixed, stationary, or portable surface typically intended for dry use and for tasks other than food preparation, personal lavation, or laundering that presents an incidental risk of spillage of smaller quantities of beverages and other liquids upon outlets mounted directly on or recessed in the surface. (CMP-2)

Informational Note No. 1: See UL 111, *Outline of Investigation for Multioutlet Assemblies*, and UL 962A, *Furniture Power Distribution Units*, which establish the performance evaluation criteria and construction criteria.

Informational Note No. 2: See 406.5(F), 406.5(G)(1), and 406.5(H) for information on receptacles for work surfaces distinguished from receptacles for counters and countertops.

**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. (645) (CMP-12)

**Statement of Problem and Substantiation for Public Input**

GFPE devices, by definition, are installed to protect equipment from ground fault events. GFPE devices are required throughout the NEC and therefore the GFPE definition needs to remain in Article 100. However, GFPE is currently required in places such as Article 555 for marinas where it is utilized specifically to mitigate the shock hazard instead of equipment protection. Creating a new definition that can replace all instances of GFPE within Article 555 will help demonstrate the intent of the ground-fault requirements.

ELCI devices are already an industry standard, and they are recognized in such regulatory bodies as the ABYC (American Boat and Yacht Council). In ABYC's E11 standards, all boats are required to install an ELCI on the incoming main power with a trip level at a maximum of 30mA and trip time maximum of 100 ms.

The operating times required under UL 1053 Table 22.1 (listed below) for GFPE trip times are not adequate for protecting people in the marina environment.

115% of pickup	Trip time = "ultimately"
150% of pickup	Trip time = 2000ms
200% of pickup	Trip time = 1000ms

With the introduction and implementation of a new ELCI definition in Article 555.35, CMP-07 can define new trip time standards independent of the inadequate GFPE requirements for the marina environment.

**Related Public Inputs for This Document**

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 3912-NFPA 70-2023 [Article 100]</u>	
<u>Public Input No. 4439-NFPA 70-2023 [Section No. 555.35]</u>	

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<b>Committee:</b>	NEC-P07



## Public Input No. 3912-NFPA 70-2023 [ Article 100 ]

### Article 100 Definitions

**Scope.** This article contains only those definitions essential to the application of this Code. It is not intended to include commonly defined general terms or commonly defined technical terms from related codes and standards. An article number in parentheses following the definition indicates that the definition only applies to that article.

Informational Note: A definition that is followed by a reference in brackets has been extracted from one of the following standards. Only editorial changes were made to the extracted text to make it consistent with this Code.

- (1) NFPA 30A-2021, *Code for Motor Fuel Dispensing Facilities and Repair Garages*
- (2) NFPA 33-2021, *Standard for Spray Application Using Flammable or Combustible Materials*
- (3) NFPA 75-2020, *Standard for the Fire Protection of Information Technology Equipment*
- (4) NFPA 79-2021, *Electrical Standard for Industrial Machinery*
- (5) NFPA 99-2021, *Health Care Facilities Code*
- (6) NFPA 101<sup>®</sup>-2022, *Life Safety Code*<sup>®</sup>
- (7) NFPA 110-2019, *Standard for Emergency and Standby Power Systems*
- (8) NFPA 303-2021, *Fire Protection Standard for Marinas and Boatyards*
- (9) NFPA 307-2021, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*
- (10) NFPA 499-2021, *Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*
- (11) NFPA 501-2022, *Standard on Manufactured Housing*
- (12) NFPA 790-2021, *Standard for Competency of Third-Party Field Evaluation Bodies*
- (13) NFPA 1192-2021, *Standard on Recreational Vehicles*

**Accessible (as applied to equipment).**

Capable of being reached for operation, renewal, and inspection. (CMP-1)

**Accessible (as applied to wiring methods).**

Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in or blocked by the structure, other electrical equipment, other building systems, or finish of the building. (CMP-1)

**Accessible, Readily (Readily Accessible).**

Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to take actions such as to use tools (other than keys), to climb over or under, to remove obstacles, or to resort to portable ladders, and so forth. (CMP-1)

Informational Note: Use of keys is a common practice under controlled or supervised conditions and a common alternative to the ready access requirements under such supervised conditions as provided elsewhere in the NEC.

**Adapter.**

A device used to adapt a circuit from one configuration of an attachment plug or receptacle to another configuration with the same current rating. (520) (CMP-15)

**Adjustable Speed Drive.**

Power conversion equipment that provides a means of adjusting the speed of an electric motor. (CMP-11)

Informational Note: A variable frequency drive is one type of electronic adjustable speed drive that controls the rotational speed of an ac electric motor by controlling the frequency and voltage of the electrical power supplied to the motor.

**Adjustable Speed Drive System.**

A combination of an adjustable speed drive, its associated motor(s), and auxiliary equipment. (CMP-11)

**Aircraft Painting Hangar.**

An aircraft hangar constructed for the express purpose of spraying, coating, and/or dipping applications and provided with dedicated ventilation supply and exhaust. (CMP-14)

**Alternate Power Source.**

One or more generator sets, or battery systems where permitted, intended to provide power during the interruption of the normal electrical service; or the public utility electrical service intended to provide power during interruption of service normally provided by the generating facilities on the premises. [ 99: 3.3.4] (517) (CMP-15)

**Ambulatory Health Care Occupancy.**

An occupancy used to provide services or treatment simultaneously to four or more patients that provides, on an outpatient basis, one or more of the following:

- (1) Treatment for patients that renders the patients incapable of taking action for self-preservation under emergency conditions without the assistance of others.
- (2) Anesthesia that renders the patients incapable of taking action for self-preservation under emergency conditions without the assistance of others.
- (3) Treatment for patients who, due to the nature of their injury or illness, are incapable of taking action for self-preservation under emergency conditions without the assistance of others.

[ 101 : 3.3.198.1] (517) (CMP-15)

**Ampacity.**

The maximum current, in amperes, that a conductor can carry continuously under the conditions of use without exceeding its temperature rating. (CMP-6)

**Amplifier (Audio Amplifier) (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 to denote an audio amplifier. (640) (CMP-12)

**Appliance.**

Utilization equipment, generally other than industrial, that is fastened in place, stationary, or portable; is normally built in a standardized size or type; and is installed or connected as a unit to perform one or more functions such as clothes washing, air-conditioning, food mixing, deep frying, and so forth. (CMP-17)

**Applicator.**

The device used to transfer energy between the output circuit and the object or mass to be heated. (665) (CMP-12)

**Approved.**

Acceptable to the authority having jurisdiction. (CMP-1)

**Arc-Fault Circuit Interrupter (AFCI).**

A device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected. (CMP-2)

**Array.**

A mechanically and electrically integrated grouping of modules with support structure, including any attached system components such as inverter(s) or dc-to-dc converter(s) and attached associated wiring. (690) (CMP-4)

**Askarel.**

A generic term for a group of nonflammable synthetic chlorinated hydrocarbons used as electrical insulating media. (CMP-9)

Informational Note: Askarels of various compositional types are used. Under arcing conditions, the gases produced, while consisting predominantly of noncombustible hydrogen chloride, can include varying amounts of combustible gases, depending on the askarel type.

**Associated Apparatus.**

Apparatus in which the circuits are not necessarily intrinsically safe themselves but that affects the energy in the intrinsically safe circuits and is relied on to maintain intrinsic safety. Such apparatus is one of the following:

- (1) Electrical apparatus that has an alternative type of protection for use in the appropriate hazardous (classified) location
- (2) Electrical apparatus not so protected that shall not be used within a hazardous (classified) location

(CMP-14)

Informational Note No. 1: Associated apparatus has identified intrinsically safe connections for intrinsically safe apparatus and also might have connections for nonintrinsically safe apparatus.

Informational Note No. 2: An example of associated apparatus is an intrinsic safety barrier, which is a network designed to limit the energy (voltage and current) available to the protected circuit in the hazardous (classified) location under specified fault conditions.

Informational Note No. 3: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*; ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”*; and ANSI/ISA RP 12.06.01, *Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation — Part 1: Intrinsic Safety*, for additional information.

### **Associated Nonincendive Field Wiring Apparatus.**

Apparatus in which the circuits are not necessarily nonincendive themselves but that affects the energy in nonincendive field wiring circuits and is relied on to maintain nonincendive energy levels. Such apparatus is one of the following:

- (1) Electrical apparatus that has an alternative type of protection for use in the appropriate hazardous (classified) location
- (2) Electrical apparatus not so protected that shall not be used within a hazardous (classified) location

(CMP-14)

Informational Note No. 1: Associated nonincendive field wiring apparatus has designated associated nonincendive field wiring apparatus connections for nonincendive field wiring apparatus and also might have connections for other electrical apparatus.

Informational Note No. 2: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

### **Attachment Fitting, Weight-Supporting (WSAF) (Weight-Supporting Attachment Fitting).**

A device that, by insertion into a weight-supporting ceiling receptacle, establishes a connection between the conductors of the attached utilization equipment and the branch-circuit conductors connected to the weight-supporting ceiling receptacle. (CMP-18)

Informational Note No. 1: A weight-supporting attachment fitting is different from an attachment plug because no cord is associated with the fitting. A weight-supporting attachment fitting in combination with a weight-supporting ceiling receptacle secures the associated utilization equipment in place and supports its weight.

Informational Note No. 2: See ANSI/NEMA WD 6, *American National Standard for Wiring Devices — Dimensional Specifications*, for the standard configuration of weight-supporting attachment fittings and related weight-supporting ceiling receptacles.

### **Attachment Plug (Plug Cap) (Plug).**

A device that, by insertion in a receptacle, establishes a connection between the conductors of the attached flexible cord and the conductors connected permanently to the receptacle. (CMP-18)

### **Audio Autotransformer.**

A transformer with a single winding and multiple taps intended for use with an amplifier loudspeaker signal output. (640) (CMP-12)

### **Audio Signal Processing Equipment (Audio 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 Article 640, the terms equipment and audio equipment are assumed to be equivalent to audio signal processing equipment. (640) (CMP-12)

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 (using analog or digital techniques) that have nonhazardous levels of voltage or current.

**Audio System.**

The totality of all equipment and interconnecting wiring used to fabricate a fully functional audio signal processing, amplification, and reproduction system. (640) (CMP-12)

**Audio Transformer.**

A transformer with two or more electrically isolated windings and multiple taps intended for use with an amplifier loudspeaker signal output. (640) (CMP-12)

**Authority Having Jurisdiction (AHJ).**

An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure. (CMP-1)

Informational Note: The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

**Automatic.**

Performing a function without the necessity of human intervention. (CMP-1)

**Bathroom.**

An area including a sink with one or more of the following: a toilet, a urinal, a tub, a shower, a bidet, or similar plumbing fixtures. (CMP-2)

**Battery.**

A single cell or a group of cells connected together electrically in series, in parallel, or a combination of both. (CMP-13)

**Battery, Flow. (Flow Battery)**

An energy storage component that stores its active materials in the form of one or two electrolytes external to the reactor interface. When in use, the electrolytes are transferred between reactor and storage tanks. (706) (CMP-13)

Informational Note: Three commercially available flow battery technologies are zinc air, zinc bromine, and vanadium redox, sometimes referred to as *pumped electrolyte ESS*.

**Battery, Sealed. (Sealed Battery)**

A battery that has no provision for the routine addition of water or electrolyte or for external measurement of electrolyte specific gravity and might contain pressure relief venting. (CMP-13)

**Battery, Stationary Standby. (Stationary Standby Battery)**

A battery that spends the majority of the time on continuous float charge or in a high state of charge, in readiness for a discharge event. (CMP-13)

Informational Note: Uninterruptible Power Supply (UPS) batteries are an example that falls under this definition.

**Battery-Powered Lighting Units.**

Individual unit equipment for backup illumination consisting of a rechargeable battery; a battery-charging means; provisions for one or more lamps mounted on the equipment, or with terminals for remote lamps, or both; and a relaying device arranged to energize the lamps automatically upon failure of the supply to the unit equipment. (517) (CMP-15)



**Berth.**

The water space to be occupied by a boat or other vessel alongside or between bulkheads, piers, piles, fixed and floating docks, or any similar access structure. [ **303: 3.3.2**] (555) (CMP-7)

Informational Note: See the definition of *Slip* for additional information.

**Bipolar Circuit.**

A dc circuit that is comprised of two monopole circuits, each having an opposite polarity connected to a common reference point. (CMP-4)

**Block.**

A square or portion of a city, town, or village enclosed by streets and including the alleys so enclosed, but not any street. (800) (CMP-16)

**Boatyard.**

A facility used for constructing, repairing, servicing, hauling from the water, storing (on land and in water), and launching of boats. [ **303: 3.3.3**] (555) (CMP-7)

**Bodies of Water, Artificially Made. (Artificially Made Bodies of Water)**

Bodies of water that have been constructed or modified to fit some decorative or commercial purpose such as, but not limited to, aeration ponds, fish farm ponds, storm retention basins, treatment ponds, and irrigation (channel) facilities. Water depths may vary seasonally or be controlled. (682) (CMP-17)

**Bodies of Water, Natural. (Natural Bodies of Water)**

Bodies of water such as lakes, streams, ponds, rivers, and other naturally occurring bodies of water, which may vary in depth throughout the year. (682) (CMP-17)

**Bonded (Bonding).**

Connected to establish electrical continuity and conductivity. (CMP-5)

**Bonding Conductor (Bonding Jumper).**

A conductor that ensures the required electrical conductivity between metal parts that are required to be electrically connected. (CMP-5)

**Bonding Jumper, Equipment. (Equipment Bonding Jumper)**

The connection between two or more portions of the equipment grounding conductor. (CMP-5)

**Bonding Jumper, Main. (Main Bonding Jumper)**

The connection between the grounded circuit conductor and the equipment grounding conductor, or the supply-side bonding jumper, or both, at the service. (CMP-5)

**Bonding Jumper, Supply-Side. (Supply-Side Bonding Jumper)**

A conductor installed on the supply side of a service or within a service equipment enclosure(s), or for a separately derived system, that ensures the required electrical conductivity between metal parts required to be electrically connected. (CMP-5)

**Bonding Jumper, System. (System Bonding Jumper)**

The connection between the grounded circuit conductor and the supply-side bonding jumper, or the equipment grounding conductor, or both, at a separately derived system. (CMP-5)

**Border Light.**

A permanently installed overhead strip light. (520) (CMP-15)

**Bottom Shield.**

A protective layer that is installed between the floor and flat conductor cable (Type FCC) to protect the cable from physical damage and may or may not be incorporated as an integral part of the cable. (324) (CMP-6)

**Branch Circuit (Branch-Circuit).**

The circuit conductors between the final overcurrent device protecting the circuit and the outlet(s). (CMP-2)

**Branch Circuit, Appliance. (Appliance Branch Circuit)**

A branch circuit that supplies energy to one or more outlets to which appliances are to be connected and that has no permanently connected luminaires that are not a part of an appliance. (CMP-2)

**Branch Circuit, General-Purpose. (General-Purpose Branch Circuit)**

A branch circuit that supplies two or more receptacles or outlets for lighting and appliances. (CMP-2)

**Branch Circuit, Individual. (Individual Branch Circuit)**

A branch circuit that supplies only one utilization equipment. (CMP-2)

**Branch Circuit, Motor. (Motor Branch Circuit)**

The circuit conductors, including equipment, between the motor branch-circuit short-circuit and ground-fault protective device and an individual motor. (CMP-11)

**Branch Circuit, Multiwire. (Multiwire Branch Circuit)**

A branch circuit that consists of two or more ungrounded conductors that have a voltage between them, and a neutral conductor that has equal voltage between it and each ungrounded conductor of the circuit and that is connected to the neutral conductor of the system. (CMP-2)

**Branch-Circuit Selection Current (BCSC).**

The value in amperes to be used instead of the rated-load current in determining the ratings of motor branch-circuit conductors, disconnecting means, controllers, and branch-circuit short-circuit and ground-fault protective devices wherever the running overload protective device permits a sustained current greater than the specified percentage of the rated-load current. The value of branch-circuit selection current will always be equal to or greater than the marked rated-load current. (440) (CMP-11)

**Breakout Assembly.**

An adapter used to connect a multipole connector containing two or more branch circuits to multiple individual branch-circuit connectors. (520) (CMP-15)

**Broadband.**

Wide bandwidth data transmission that transports multiple signals, protocols, and traffic types over various media types. (CMP-16)

**Building.**

A structure that stands alone or that is separated from adjoining structures by fire walls. (CMP-1)

**Building, Floating. (Floating Building)**

A building that floats on water, is moored in a permanent location, and has a premises wiring system served through connection by permanent wiring to an electrical supply system not located on the premises. (CMP-7)

**Building, Manufactured. (Manufactured Building)**

Any building that is of closed construction and is made or assembled in manufacturing facilities on or off the building site for installation, or for assembly and installation on the building site, other than manufactured homes, mobile homes, park trailers, or recreational vehicles. (545) (CMP-7)

**Building Component.**

Any subsystem, subassembly, or other system designed for use in or integral with or as part of a structure, which can include structural, electrical, mechanical, plumbing, and fire protection systems, and other systems affecting health and safety. (545) (CMP-7)

**Building System.**

Plans, specifications, and documentation for a system of manufactured building or for a type or a system of building components, which can include structural, electrical, mechanical, plumbing, and fire protection systems, and other systems affecting health and safety, and including such variations thereof as are specifically permitted by regulation, and which variations are submitted as part of the building system or amendment thereto. (545) (CMP-7)

**Bulkhead.**

A vertical structural wall, usually of stone, timber, metal, concrete, or synthetic material, constructed along, and generally parallel to, the shoreline to retain earth as an extension of the upland, and often to provide suitable water depth at the waterside face. [ 303: 3.3.5] (555) (CMP-7)

**Bull Switch.**

An externally operated wall-mounted safety switch that can contain overcurrent protection and is designed for the connection of portable cables and cords. (530) (CMP-15)

**Bundled.**

Cables or conductors that are tied, wrapped, taped, or otherwise periodically bound together. (520) (CMP-15)

**Busbar.**

A noninsulated conductor electrically connected to the source of supply and physically supported on an insulator providing a power rail for connection to utilization equipment, such as sensors, actuators, A/V devices, low-voltage luminaire assemblies, and similar electrical equipment. (393) (CMP-18)

**Busbar Support.**

An insulator that runs the length of a section of suspended ceiling bus rail that serves to support and isolate the busbars from the suspended grid rail. (393) (CMP-18)

**Busway.**

A raceway consisting of a metal enclosure containing factory-mounted, bare or insulated conductors, which are usually copper or aluminum bars, rods, or tubes. (CMP-8)

**Cabinet.**

An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung. (CMP-9)

**Cable, Abandoned. (Abandoned Cable)**

Installed cable that is not terminated at equipment other than a termination fitting or a connector and is not identified for future use with a tag. (CMP-16)

Informational Note: See 640.6(B) , 645.5(G) , 722.25 , 760.25 , 770.25 , and 800.25 for requirements covering the removal of abandoned cables.

**Cable, Armored (Type AC). (Armored Cable)**

A fabricated assembly of insulated conductors in a flexible interlocked metallic armor. (CMP-6)

**Cable, Circuit Integrity (CI). (Circuit Integrity Cable)**

Cable(s) marked with the suffix “-CI” used for remote-control, signaling, power-limited, fire alarm, optical fiber, or communications systems that supply critical circuits to ensure survivability for continued circuit operation for a specified time under fire conditions. (CMP-3)

Informational Note: See 728.4 for power circuits installed for survivability.

**Cable, Coaxial. (Coaxial Cable)**

A cylindrical assembly composed of a conductor centered inside a metallic tube or shield, separated by a dielectric material, and usually covered by an insulating jacket. (CMP-16)

**Cable, Festoon. (Festoon Cable)**

Single- and multiple-conductor cable intended for use and installation where flexibility is required. (610) (CMP-12)

**Cable, Flat Conductor (Type FCC). (Flat Conductor Cable)**

Three or more separate flat copper conductors placed horizontally edge-to-edge and enclosed within an insulating assembly. (324) (CMP-6)

**Cable, Instrumentation Tray (Type ITC). (Instrumentation Tray Cable)**

A factory assembly of two or more insulated conductors, with or without an equipment grounding conductor(s), enclosed in a nonmetallic sheath. (CMP-3)

**Cable, Integrated Gas Spacer (Type IGS). (Integrated Gas Spacer Cable)**

A factory assembly of one or more conductors, each individually insulated and enclosed in a loose fit, nonmetallic flexible conduit as an integrated gas spacer cable rated 0 volts through 600 volts. (CMP-6)

**Cable, Limited Use. (Limited-Use Cable)**

Cables that are intended to be used with protection such as a raceway or for specific restricted applications. (722) (CMP-3)

**Cable, Medium Voltage (Type MV). (Medium Voltage Cable)**

A single or multiconductor solid dielectric insulated cable rated 2001 volts up to and including 35,000 volts, nominal. (CMP-6)

**Cable, Metal Clad (Type MC). (Metal Clad Cable)**

A factory assembly of one or more insulated circuit conductors with or without optical fiber members enclosed in an armor of interlocking metal tape, or a smooth or corrugated metallic sheath. (CMP-6)

**Cable, Metallic Conductor. (Metallic Conductor Cable)**

A factory assembly of two or more conductors having an overall covering. (CMP-16)

**Cable, Mineral-Insulated, Metal-Sheathed (Type MI). (Mineral-Insulated, Metal-Sheathed Cable)**

A factory assembly of one or more conductors insulated with a highly compressed refractory mineral insulation and enclosed in a liquidtight and gastight continuous copper or alloy steel sheath. (CMP-6)

**Cable, Nonmetallic-Sheathed.**

A factory assembly of two or more insulated conductors enclosed within an overall nonmetallic jacket. (CMP-6)

**Cable, Nonmetallic-Sheathed (Type NM).**

Insulated conductors enclosed within an overall nonmetallic jacket. (CMP-6)

**Cable, Nonmetallic-Sheathed (Type NMC).**

Insulated conductors enclosed within an overall, corrosion resistant, nonmetallic jacket. (CMP-6)

**Cable, Optical Fiber. (Optical Fiber Cable)**

A factory assembly or field assembly of one or more optical fibers having an overall covering. (CMP-16)

Informational Note: A field-assembled optical fiber cable is an assembly of one or more optical fibers within a jacket. The jacket, without optical fibers, is installed in a manner similar to conduit or raceway. Once the jacket is installed, the optical fibers are inserted into the jacket, completing the cable assembly.

**Cable, Optical Fiber, Conductive. (Conductive Optical Fiber Cable)**

A factory assembly of one or more optical fibers having an overall covering and containing non-current-carrying conductive member(s) such as metallic strength member(s), metallic vapor barrier(s), metallic armor, or metallic sheath. (CMP-16)

**Cable, Optical Fiber, Hybrid. (Hybrid Optical Fiber Cable)**

A cable containing optical fibers and current-carrying electrical conductors. (CMP-16)

**Cable, Optical Fiber, Nonconductive. (Nonconductive Optical Fiber Cable)**

A factory assembly of one or more optical fibers having an overall covering and containing no electrically conductive materials. (CMP-16)

**Cable, Optical Fiber, Protected. (Protected Optical Fiber Cable)**

Optical fiber cable protected from releasing optical radiation into the atmosphere during normal operating conditions and foreseeable malfunctions by additional armoring, conduit, cable tray, or raceway. (CMP-14)

Informational Note: See ANSI/UL 60079-28, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*, for additional information.

**Cable, Portable Power Feeder. (Portable Power Feeder Cable)**

One or more flexible shielded insulated power conductors enclosed in a flexible covering rated from 2001 to 25,000 volts. (CMP-6)

**Cable, Power and Control Tray (Type TC). (Power and Control Tray Cable)**

A factory assembly of two or more insulated conductors, with or without associated bare or covered equipment grounding conductors, under a nonmetallic jacket. (CMP-6)

**Cable, Power-Limited Tray (Type PLTC). (Power-Limited Tray Cable)**

A factory assembly of two or more insulated conductors rated at 300 volts, with or without associated bare or insulated equipment grounding conductors, under a nonmetallic jacket. (CMP-3)

**Cable, Service. (Service Cable)**

Service conductors made up in the form of a cable. (CMP-10)

**Cable, Service Entrance. (Service Entrance Cable)**

A single conductor or multiconductor cable provided with an overall covering, primarily used for services. (CMP-6)

**Cable, Service Entrance (Type SE).**

Service-entrance cable having a flame-retardant, moisture-resistant covering. (CMP-6)

**Cable, Service Entrance (Type USE).**

Service-entrance cable, identified for underground use, having a moisture-resistant covering, but not required to have a flame-retardant covering. (CMP-6)

**Cable, Type P.**

A factory assembly of one or more insulated flexible tinned copper conductors, with associated equipment grounding conductor(s), with or without a braided metallic armor and with an overall nonmetallic jacket. (CMP-6)

**Cable, Under Carpet. (Under Carpet Cable)**

Cables that are intended to be used under carpeting, floor covering, modular tiles, and planks. (722) (CMP-3)

**Cable, Underground Feeder and Branch-Circuit (Type UF). (Underground Feeder and Branch-Circuit Cable)**

A factory assembly of one or more insulated conductors with an integral or an overall covering of nonmetallic material suitable for direct burial in the earth. (CMP-6)

**Cable Assembly, Flat (Type FC). (Flat Cable Assembly)**

An assembly of parallel conductors formed integrally with an insulating material web specifically designed for field installation in surface metal raceway. (CMP-6)

**Cable Bundle.**

A group of cables that are tied together or in contact with one another in a closely packed configuration for at least 1.0 m (40 in.). (CMP-3)

Informational Note: Random or loose installation of individual cables can result in less heating. Combining of the cables can result in less heat dissipation and more signal cross talk between cables.

**Cable Connector.**

A connector designed to join flat conductor cables (Type FCC) without using a junction box. (324) (CMP-6)

**Cable Connector [as applied to hazardous (classified) locations].**

An electrical device that is part of a cable assembly and that, by insertion of two mating configurations, establishes a connection between the conductors of the cable assembly and the conductors of a fixed piece of equipment. (CMP-14)

Informational Note No. 1: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for information on the use of cable connectors.

Informational Note No. 2: Cable connectors in other than hazardous (classified) locations are referred to as male and female fittings.

Informational Note No. 3: See ANSI/UL 2238, *Cable Assemblies and Fittings for Industrial Control and Signal Distribution*, and ANSI/UL 2237, *Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery*, for examples of standards on male and female fittings in other than hazardous (classified) locations.

**Cable Joint.**

A connection consisting of an insulation system and a connector where two (or more) medium voltage (Type MV) cables are joined together. (CMP-6)

**Cable Management System.**

An apparatus designed to control and organize lengths of cable or cord. (CMP-12)

**Cable Routing Assembly.**

A single channel or connected multiple channels, as well as associated fittings, forming a structural system that is used to support and route communications wires and cables, optical fiber cables, data cables associated with information technology and communications equipment, Class 2, Class 3, and Type PLTC cables, and power-limited fire alarm cables in plenum, riser, and general-purpose applications. (CMP-16)



**Cable Sheath.**

A single or multiple layers of a protective covering that holds and protects the conductors or optical fibers, or both, contained inside. (CMP-16)

**Cable System, Fire-Resistive. (Fire-Resistive Cable System)**

A cable and components used to ensure survivability of critical circuits for a specified time under fire conditions. (CMP-3)

**Cable System, Flat Conductor. (Flat Conductor Cable System)**

A complete wiring system for branch circuits that is designed for installation under carpet squares. (324) (CMP-6)

Informational Note: The FCC system includes Type FCC cable and associated shielding, connectors, terminators, adapters, boxes, and receptacles.

**Cable Termination.**

A connection consisting of an insulation system and a connector and installed on a medium voltage (Type MV) cable to connect from a cable to a device, such as equipment. (CMP-6)

**Cable Tray System.**

A unit or assembly of units or sections and associated fittings forming a structural system used to securely fasten or support cables and raceways. (CMP-8)

**Cablebus.**

An assembly of units or sections with insulated conductors having associated fittings forming a structural system used to securely fasten or support conductors and conductor terminations in a completely enclosed, ventilated, protective metal housing. This assembly is designed to carry fault current and to withstand the magnetic forces of such current. (CMP-8)

Informational Note: Cablebus is ordinarily assembled at the point of installation from the components furnished or specified by the manufacturer in accordance with instructions for the specific job.

**Cell (as applied to batteries).**

The basic electrochemical unit, characterized by an anode and a cathode, used to receive, store, and deliver electrical energy. (CMP-13)

**Cell, Sealed. (Sealed Cell)**

A cell that has no provision for the routine addition of water or electrolyte or for external measurement of electrolyte specific gravity and might contain pressure relief venting. (CMP-13)

**Cell Line.**

An assembly of electrically interconnected electrolytic cells supplied by a source of direct-current power. (CMP-12)

**Cell Line Attachments and Auxiliary Equipment.**

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. (668) (CMP-12)

**Charge Controller.**

Equipment that controls dc voltage or dc current, or both, and that is used to charge a battery or other energy storage device. (CMP-13)



**Charger Power Converter.**

The device used to convert energy from the power grid to a high-frequency output for wireless power transfer. (625) (CMP-12)

**Child Care Facility.**

A building or structure, or portion thereof, for educational, supervisory, or personal care services for more than four children 7 years old or less. (406) (CMP-18)

**Circuit Breaker.**

A device designed to open and close a circuit by nonautomatic means and to open the circuit automatically on a predetermined overcurrent without damage to itself when properly applied within its rating. (CMP-10)

Informational Note: The automatic opening means can be integral, direct acting with the circuit breaker, or remote from the circuit breaker.

**Circuit Breaker, Adjustable. (Adjustable Circuit Breaker)**

A qualifying term indicating that the circuit breaker can be set to trip at various values of current, time, or both, within a predetermined range. (CMP-10)

**Circuit Breaker, Instantaneous Trip. (Instantaneous Trip Circuit Breaker)**

A qualifying term indicating that no delay is purposely introduced in the tripping action of the circuit breaker. (CMP-10)

**Circuit Breaker, Inverse Time. (Inverse Time Circuit Breaker)**

A qualifying term indicating that there is a delay purposely introduced in the tripping action of the circuit breaker, and the delay decreases as the magnitude of the current increases. (CMP-10)

**Circuit Breaker, Nonadjustable. (Nonadjustable Circuit Breaker)**

A qualifying term indicating that the circuit breaker does not have any adjustment to alter the value of the current at which it will trip or the time required for its operation. (CMP-10)

**Class 1 Circuit.**

The portion of the wiring system between the load side of the Class 1 power source and the connected equipment. (CMP-3)

**Class 2 Circuit.**

The portion of the wiring system between the load side of a Class 2 power source and the connected equipment. Due to its power limitations, a Class 2 circuit considers safety from a fire initiation standpoint and provides acceptable protection from electric shock. (CMP-3)

**Class 3 Circuit.**

The portion of the wiring system between the load side of a Class 3 power source and the connected equipment. Due to its power limitations, a Class 3 circuit considers safety from a fire initiation standpoint. Since higher levels of voltage and current than for Class 2 are permitted, additional safeguards are specified to provide protection from an electric shock hazard that could be encountered. (CMP-3)

**Class 4 Circuit.**

The portion of the wiring system between the load side of a Class 4 transmitter and the Class 4 receiver or Class 4 utilization equipment, as appropriate. Due to the active monitoring and control of the voltage and current provided, a Class 4 circuit considers safety from a fire initiation standpoint and provides acceptable protection from electric shock. (726) (CMP-3)

Informational Note: A Class 4 circuit is also commonly referred to as a fault-managed power circuit.

**Class 4 Device.**

Any active device connected to the Class 4 circuit; examples include a Class 4 transmitter, a Class 4 receiver, or Class 4 utilization equipment. (CMP-3)

**Class 4 Power System.**

An actively monitored and controlled system consisting of one or more Class 4 transmitters and one or more Class 4 receivers connected by a cabling system. (CMP-3)

**Class 4 Receiver.**

A device that accepts Class 4 power and converts it for use by utilization equipment. (CMP-3)

**Class 4 Transmitter.**

A device that sources Class 4 power. (726) (CMP-3)

Informational Note: A Class 4 transmitter is different from traditional power sources in that it monitors the line for faults (both line-to-line and line-to-ground) and ceases power transmission if a fault is sensed.

**Class 4 Utilization Equipment.**

Devices that are directly powered by a Class 4 transmitter without the need for a separate Class 4 receiver (the receiver is integrated into the equipment). (CMP-3)

**Closed Construction.**

Any building, building component, assembly, or system manufactured in such a manner that all concealed parts of processes of manufacture cannot be inspected after installation at the building site without disassembly, damage, or destruction. (545) (CMP-7)

**Clothes Closet.**

A nonhabitable room or space intended primarily for storage of garments and apparel. (CMP-1)

**Clothes Closet Storage Space.**

The area within a clothes closet in which combustible materials can be kept. (410) (CMP-18)

**Collector Rings.**

An assembly of slip rings for transferring electric energy from a stationary to a rotating member. (675) (CMP-7)

**Combiner (DC) (dc Combiner) (Direct-Current Combiner)**

An enclosure that includes devices used to connect two or more PV system dc circuits in parallel. (690) (CMP-4)

**Combustible Dust.**

Solid particles that are 500  $\mu\text{m}$  or smaller (i.e., material passing a U.S. No. 35 Standard Sieve as defined in ASTM E11-17, *Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves*) that can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature. [ 499: 3.3.3] (CMP-14)

Informational Note: See ASTM E1226, *Standard Test Method for Explosibility of Dust Clouds*; ISO 6184-1, *Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air*; or ANSI/UL 80079-20-2, *Explosive Atmospheres — Part 20-2: Material Characteristics — Combustible Dusts Test Methods*, for procedures for determining the explosibility of dusts. Historically, explosibility has been described as presenting a flash fire or explosion hazard. It could be understood that potential hazards due to the formation of an explosible mixture when suspended in air at standard atmospheric pressure and temperature would include ignition.

**Combustible Gas Detection System.**

A protection technique utilizing stationary gas detectors in industrial establishments. (CMP-14)

**Commissioning.**

The process, procedures, and testing used to set up and verify the initial performance, operational controls, safety systems, and sequence of operation of electrical devices and equipment, prior to it being placed into active service. (CMP-13)

**Communications Circuit.**

A metallic, fiber, or wireless circuit that provides voice/data (and associated power) for communications-related services between communications equipment. (CMP-16)

**Communications Circuit, Network-Powered Broadband. (Network-Powered Broadband Communications Circuit)**

The circuit extending from the communications utility's or service provider's serving terminal or tap up to and including the network interface unit (NIU). (830) (CMP-16)

Informational Note: A typical one-family dwelling network-powered communications circuit consists of a communications drop or communications service cable and an NIU and includes the communications utility's serving terminal or tap where it is not under the exclusive control of the communications utility.

**Communications Circuit, Premises. (Premises Communications Circuit)**

The circuit that extends voice, audio, video, data, interactive services, telegraph (except radio), and outside wiring for fire alarm and burglar alarm from the service provider's network terminal to the customer's communications equipment. (840) (CMP-16)

**Communications Equipment.**

The electronic equipment that performs the telecommunications operations for the transmission of audio, video, and data, and includes power equipment (e.g., dc converters, inverters, and batteries), technical support equipment (e.g., computers), and conductors dedicated solely to the operation of the equipment. (CMP-16)

Informational Note: As the telecommunications network transitions to a more data-centric network, computers, routers, servers, and their powering equipment, are becoming essential to the transmission of audio, video, and data and are finding increasing application in communications equipment installations.

**Communications Service Provider.**

An organization, business, or individual that offers communications service to others. (CMP-16)

**Community Antenna Television Circuit (CATV).**

The circuit that extends community antenna television systems for audio, video, data, and interactive services from the service provider's network terminal to the appropriate customer equipment. (CMP-16)

**Concealable Nonmetallic Extension.**

A listed assembly of two, three, or four insulated circuit conductors within a nonmetallic jacket, an extruded thermoplastic covering, or a sealed nonmetallic covering. The classification includes surface extensions intended for mounting directly on the surface of walls or ceilings and concealed with paint, texture, joint compound, plaster, wallpaper, tile, wall paneling, or other similar materials. (CMP-6)

**Concealed.**

Rendered inaccessible by the structure or finish of the building. (CMP-1)

Informational Note: Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.

**Concealed Knob-and-Tube Wiring.**

A wiring method using knobs, tubes, and flexible nonmetallic tubing for the protection and support of single insulated conductors. (CMP-6)

**Conductor, Bare. (Bare Conductor)**

A conductor having no covering or electrical insulation whatsoever. (CMP-6)

**Conductor, Copper-Clad Aluminum. (Copper-Clad Aluminum Conductor)**

Conductor drawn from a copper-clad aluminum rod, with the copper metallurgically bonded to an aluminum core. (CMP-6)

**Conductor, Covered. (Covered Conductor)**

A conductor encased within material of composition or thickness that is not recognized by this Code as electrical insulation. (CMP-6)

**Conductor, Insulated. (Insulated Conductor)**

A conductor encased within material of composition and thickness that is recognized by this Code as electrical insulation. (CMP-6)

**Conductor, Insulated. (Insulated Conductor)**

Overhead service conductor encased in a polymeric material adequate for the applied nominal voltage and any conductor types described in 310.4. (396) (CMP-6)

Informational Note: See ICEA S-76-474-2011, *Standard for Neutral Supported Power Cable Assemblies with Weather-Resistant Extruded Insulation Rated 600 Volts*, for information about overhead service conductors.

**Conductors, Outdoor Overhead. (Outdoor Overhead Conductors)**

Single conductors, insulated, covered, or bare, installed outdoors on support structures in free air. (395) (CMP-6)

**Conduit, Flexible Metal (FMC). (Flexible Metal Conduit)**

A raceway of circular cross section made of helically wound, formed, interlocked metal strip. (CMP-8)

**Conduit, High Density Polyethylene (HDPE). (High Density Polyethylene Conduit)**

A nonmetallic raceway of circular cross section, with associated couplings, connectors, and fittings for the installation of electrical conductors. (CMP-8)

**Conduit, Intermediate Metal (IMC). (Intermediate Metal Conduit)**

A steel 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. (CMP-8)

**Conduit, Liquidtight Flexible Metal (LFMC). (Liquidtight Flexible Metal Conduit)**

A raceway of circular cross section having an outer liquidtight, nonmetallic, sunlight-resistant jacket over an inner flexible metal core with associated couplings, connectors, and fittings for the installation of electric conductors. (CMP-8)

**Conduit, Liquidtight Flexible Nonmetallic (LFNC). (Liquidtight Flexible Nonmetallic Conduit)**

A raceway of circular cross section of various types as follows:

- (1) A smooth seamless inner core and cover bonded together and having one or more reinforcement layers between the core and covers, designated as LFNC-A
- (2) A smooth inner surface with integral reinforcement within the raceway wall, designated as LFNC-B
- (3) A corrugated internal and external surface without integral reinforcement within the raceway wall, designated as LFNC-C

(CMP-8)

Informational Note: FNMC is an alternative designation for LFNC.

**Conduit, Nonmetallic Underground with Conductors (NUCC). (Nonmetallic Underground Conduit with Conductors)**

A factory assembly of conductors or cables inside a nonmetallic, smooth wall raceway with a circular cross section. (CMP-8)

**Conduit, Reinforced Thermosetting Resin (RTRC). (Reinforced Thermosetting Resin Conduit)**

A rigid nonmetallic raceway of circular cross section, with integral or associated couplings, connectors, and fittings for the installation of electrical conductors and cables. (CMP-8)

**Conduit, Rigid Metal (RMC). (Rigid Metal Conduit)**

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. (CMP -8)

**Conduit, Rigid Polyvinyl Chloride (PVC). (Rigid Polyvinyl Chloride Conduit)**

A rigid nonmetallic raceway of circular cross section, with integral or associated couplings, connectors, and fittings for the installation of electrical conductors and cables. (CMP-8)

**Conduit Body.**

A separate portion of a conduit or tubing system that provides access through a removable cover(s) to the interior of the system at a junction of two or more sections of the system or at a terminal point of the system.

Boxes such as FS and FD or larger cast or sheet metal boxes are not classified as conduit bodies. (CMP-9)

**Connector.**

An electromechanical fitting. (393) (CMP-18)

**Connector, Intercell. (Intercell Connector)**

An electrically conductive bar or cable used to connect adjacent cells. (CMP-13)

**Connector, Intertier. (Intertier Connector)**

An electrical conductor used to connect two cells on different tiers of the same rack or different shelves of the same rack. (CMP-13)

**Connector, Load. (Load Connector)**

An electromechanical connector used for power from the busbar to utilization equipment. (393) (CMP-18)

**Connector, Pendant. (Pendant Connector)**

An electromechanical or mechanical connector used to suspend low-voltage luminaire or utilization equipment below the grid rail and to supply power to connect from the busbar to utilization equipment. (393) (CMP-18)

**Connector, Power Feed. (Power Feed Connector)**

An electromechanical connector used to connect the power supply to a power distribution cable, to connect directly to the busbar, or to connect from a power distribution cable to the busbar. (393) (CMP-18)

**Connector, Pressure (Solderless). (Pressure Connector)**

A device that establishes a connection between two or more conductors or between one or more conductors and a terminal by means of mechanical pressure and without the use of solder. (CMP-1)

**Connector, Rail to Rail. (Rail to Rail Connector)**

An electromechanical connector used to interconnect busbars from one ceiling grid rail to another grid rail. (393) (CMP-18)

**Connector Strip.**

A metal wireway containing pendant or flush receptacles. (520) (CMP-15)

**Container (as applied to batteries).**

A single-cell or multicell vessel or jar that holds the plates, electrolyte, and other elements of a single unit in a battery. (CMP-13)

**Continuous Load.**

A load where the maximum current is expected to continue for 3 hours or more. (CMP-2)

**Control.**

The predetermined process of connecting, disconnecting, increasing, or reducing electric power. (750) (CMP-13)

**Control Circuit.**

The circuit of a control apparatus or system that carries the electric signals directing the performance of the controller but does not carry the main power current. (CMP-11)

**Control Circuits, Fault-Tolerant External. (Fault-Tolerant External Control Circuits)**

Those control circuits either entering or leaving the fire pump controller enclosure, which if broken, disconnected, or shorted will not prevent the controller from starting the fire pump from all other internal or external means and may cause the controller to start the pump under these conditions. (695) (CMP-13)

**Control Device, Emergency Lighting. (Emergency Lighting Control Device)**

A separate or integral device intended to perform one or more emergency lighting control functions. (700) (CMP-13)

Informational Note: See UL 924, *Emergency Lighting and Power Equipment*, for information covering emergency lighting control devices.

**Control Drawing.**

A drawing or other document provided by the manufacturer of the intrinsically safe or associated apparatus, or of the nonincendive field wiring apparatus or associated nonincendive field wiring apparatus, that details the allowed interconnections between the intrinsically safe and associated apparatus or between the nonincendive field wiring apparatus or associated nonincendive field wiring apparatus. (CMP-14)

Informational Note: See the following standards for additional information:

- (1) ANSI/ISA/UL 120202, Recommendations for the Preparation, Content, and Organization of Intrinsic Safety Control Drawings
- (2) ANSI/UL 913, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
- (3) ANSI/UL 60079-11, Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”
- (4) ANSI/UL 121201, Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
- (5) ANSI/ISA RP 12.06.01, Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation — Part 1: Intrinsic Safety

**Control Room.**

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. (620) (CMP-12)



**Control Space.**

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, dumbwaiter, escalator, moving walk, or platform lift, but not the electrical driving machine or the hydraulic machine. (620) (CMP-12)

**Control System.**

The overall system governing the starting, stopping, direction of motion, acceleration, speed, and retardation of the moving member. (620) (CMP-12)

**Controller.**

A device or group of devices that serves to govern, in some predetermined manner, the electric power delivered to the apparatus to which it is connected. (CMP-1)

**Controller, Motion. (Motion Controller)**

The electrical device(s) for that part of the control system that governs the acceleration, speed, retardation, and stopping of the moving member. (620) (CMP-12)

Informational Note: The motor control function may be integral to the motion controller.

**Controller, Motor. (Motor Controller)**

Any switch or device that is normally used to start and stop a motor by making and breaking the motor circuit current. (CMP-11)

**Controller, Operation. (Operation Controller)**

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. (620) (CMP-12)

**Converter, DC-to-DC. (DC-to-DC Converter)**

A device that can provide an output dc voltage and current at a higher or lower value than the input dc voltage and current. (CMP-4)

**Converter Circuit, DC-to-DC. (DC-to-DC Converter Circuit)**

The dc circuit conductors connected to the output of a dc-to-dc converter. (CMP-4)

**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. (665) (CMP-12)

**Cooking Unit, Counter-Mounted. (Counter-Mounted Cooking Unit)**

A cooking appliance designed for mounting in or on a counter and consisting of one or more heating elements, internal wiring, and built-in or mountable controls. (CMP-2)

**Coordination, Selective. (Selective Coordination)**

Localization of an overcurrent condition to restrict outages to the circuit or equipment affected, accomplished by the selection and installation of overcurrent protective devices and their ratings or settings for the full range of available overcurrents, from overload to the available fault current, and for the full range of overcurrent protective device opening times associated with those overcurrents. (CMP-10)

**Cord, Flexible. (Flexible Cord)**

Two or more flexible insulated conductors enclosed in a flexible covering. (CMP-6)

**Cord Connector.**

A contact device terminated to a flexible cord that accepts an attachment plug or other insertion device. (CMP-6)



**Cord Connector [as applied to hazardous (classified) locations].**

A fitting intended to terminate a cord to a box or similar device and reduce the strain at points of termination and might include an explosionproof, a dust-ignitionproof, or a flameproof seal. (CMP-14)

**Cord Set.**

A length of flexible cord having an attachment plug at one end and a cord connector at the other end. (CMP-6)

**Corrosive Environment.**

Areas or enclosures without adequate ventilation, where electrical equipment is located and pool sanitation chemicals are stored, handled, or dispensed. (680) (CMP-17).

Informational Note No. 1: See *Advisory: Swimming Pool Chemical: Chlorine*, OSWER 90-008.1, June 1990, available from the EPA National Service Center for Environmental Publications (NSCEP) as sanitation chemicals and pool water are considered to pose a risk of corrosion (gradual damage or destruction of materials) due to the presence of oxidizers (e.g., calcium hypochlorite, sodium hypochlorite, bromine, chlorinated isocyanurates) and chlorinating agents that release chlorine when dissolved in water.

Informational Note No. 2: See ANSI/APSP-11, *Standard for Water Quality in Public Pools and Spas*, ANSI/ASHRAE 62.1, Table 6-4 Minimum Exhaust Rates, and *2021 International Swimming Pool and Spa Code (ISPSC)*, Section 324, including associated definitions and requirements concerning adequate ventilation of indoor spaces such as equipment and chemical storage rooms, which can reduce the likelihood of the accumulation of corrosive vapors. Chemicals such as chlorine cause severe corrosive and deteriorating effects on electrical connections, equipment, and enclosures when stored and kept in the same vicinity.

**Counter (Countertop).**

A fixed or stationary surface typically intended for food preparation and serving, personal lavation, or laundering or a similar surface that presents a routine risk of spillage of larger quantities of liquids upon outlets mounted directly on or in the surface. (CMP-2)

Informational Note No. 1: See UL 498, *Receptacles and Attachment Plugs*, and UL 943, *Ground-Fault Circuit Interrupters*, which establish the performance evaluation criteria and construction criteria.

Informational Note No. 2: See 406.5(E), 406.5(G)(1), and 406.5(H) for information on receptacles for counters and countertops distinguished from receptacles for work surfaces.

**Crane.**

A mechanical device used for lifting or moving boats. [ 303: 3.3.6] (555) (CMP-7)

**Critical Branch.**

A system of feeders and branch circuits supplying power for task illumination, fixed equipment, select receptacles, and select power circuits serving areas and functions related to patient care that are automatically connected to alternate power sources by one or more transfer switches during interruption of the normal power source. [ 99: 3.3.30] (517) (CMP-15)

**Critical Operations Areas, Designated (DCOA). (Designated Critical Operations Areas)**

Areas within a facility or site designated as requiring critical operations power. (CMP-13)

**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. (645) (CMP-12)

**Critical Operations Power Systems (COPS).**

Power systems for facilities or parts of facilities that require continuous operation for the reasons of public safety, emergency management, national security, or business continuity. (CMP-13)

**Cutout Box.**

An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure. (CMP-9)

**Data Center, Modular (MDC). (Modular Data Center)**

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. (646) (CMP-12)

Informational Note: 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.

**DC Plugging Box.**

A dc device consisting of one or more 2-pole, 2-wire, nonpolarized, non-grounding-type receptacles intended to be used on dc circuits only. (530) (CMP-15)

**Dead-Front.**

Without live parts exposed to a person on the operating side of the equipment. (CMP-9)

**Demand Factor.**

The ratio of the maximum demand of a system, or part of a system, to the total connected load of a system or the part of the system under consideration. (CMP-2)

**Dental Office.**

A building or part thereof in which the following occur:

- (1) Examinations and minor treatments/procedures performed under the continuous supervision of a dental professional;
- (2) Use of limited to minimal sedation and treatment or procedures that do not render the patient incapable of self-preservation under emergency conditions; and
- (3) No overnight stays for patients or 24-hour operations.

[ 99: 3.3.38] (CMP-15)

**Device.**

A unit of an electrical system, other than a conductor, that carries or controls electric energy as its principal function. (CMP-1)

**Dielectric Heating.**

Heating of a nominally insulating material due to its own dielectric losses when the material is placed in a varying electric field. (665) (CMP-12)

**Disconnecting Means.**

A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply. (CMP-1)

**Distribution Point (Center Yard Pole) (Meter Pole).**

An electrical supply point from which service drops, service conductors, feeders, or branch circuits to buildings or structures utilized under single management are supplied. (547) (CMP-7)

Informational Note: The service point is typically located at the distribution point.

**Diversion Controller (Diversion Charge Controller) (Diversion Load Controller).**

Equipment that regulates the output of a source or charging process by diverting power to direct-current or alternating-current loads or to an interconnected utility service. (CMP-13)

**Diversion Load.**

A load connected to a diversion charge controller or diversion load controller, also known as a dump load. (CMP-4)

**Docking Facility.**

A covered or open, fixed or floating structure that provides access to the water and to which boats are secured. [ 303: 3.3.7] (555) (CMP-7)

**Dormitory Unit.**

A building or a space in a building in which group sleeping accommodations are provided for more than 16 persons who are not members of the same family in one room, or a series of closely associated rooms, under joint occupancy and single management, with or without meals, but without individual cooking facilities. (CMP 2)

**Drop Box.**

A box containing pendant- or flush-mounted receptacles attached to a multiconductor cable via strain relief or a multipole connector. (520) (CMP-15)

**Dust-Ignitionproof.**

Equipment enclosed in a manner that excludes dusts and does not permit arcs, sparks, or heat otherwise generated or liberated inside of the enclosure to cause ignition of exterior accumulations or atmospheric suspensions of a specified dust on or in the vicinity of the enclosure. (CMP-14)

Informational Note No. 1: See ANSI/UL 1203, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations*, for additional information on dust-ignitionproof enclosures.

Informational Note No. 2: See NEMA 250, *Enclosures for Electrical Equipment (1000 Volts Maximum)*, for additional information on dust-ignitionproof enclosures that are sometimes marked additionally marked Type 9.

**Dusttight.**

Enclosures constructed so that dust will not enter under specified test conditions. (CMP-14)

Informational Note No. 1: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

Informational Note No. 2: See NEMA 250, *Enclosures for Electrical Equipment (1000 Volts Maximum)*, and ANSI/UL 50E, *Enclosures for Electrical Equipment, Environmental Considerations*, for additional information on enclosure Types 3, 3X, 3S, 3SX, 4, 4X, 5, 6, 6P, 12, 12K, and 13 that are considered dusttight.

**Duty, Continuous. (Continuous Duty)**

Operation at a substantially constant load for an indefinitely long time. (CMP-1)

**Duty, Intermittent. (Intermittent Duty)**

Operation for alternate intervals of (1) load and no load; or (2) load and rest; or (3) load, no load, and rest. (CMP-1)

**Duty, Periodic. (Periodic Duty)**

Intermittent operation in which the load conditions are regularly recurrent. (CMP-1)

**Duty, Short-Time. (Short-Time Duty)**

Operation at a substantially constant load for a short and definite, specified time. (CMP-1)

**Duty, Varying. (Varying Duty)**

Operation at loads, and for intervals of time, both of which may be subject to wide variation. (CMP-1)

**Dwelling, One-Family. (One-Family Dwelling)**

A building that consists solely of one dwelling unit. (CMP-1)

**Dwelling, Two-Family. (Two-Family Dwelling)**

A building that consists solely of two dwelling units. (CMP-1)

**Dwelling, Multifamily. (Multifamily Dwelling)**

A building that contains three or more dwelling units. (CMP-1)

**Dwelling Unit.**

A single unit, providing complete and independent living facilities for one or more persons, including permanent provisions for living, sleeping, cooking, and sanitation. (CMP-2)

**Electric-Discharge Lighting.**

Systems of illumination utilizing fluorescent lamps, high-intensity discharge (HID) lamps, or neon tubing. (CMP-18)

**Electric Power Production and Distribution Network.**

Power production, distribution, and utilization equipment and facilities, such as electric utility systems that are connected to premises wiring and are external to and not controlled by a system that operates in interactive mode. (CMP-13)

**Electric Sign.**

A fixed, stationary, or portable self-contained, electrically operated and/or electrically illuminated utilization equipment with words or symbols designed to convey information or attract attention. (CMP-18)

**Electric Supply Stations.**

Locations containing the generating stations and substations, including their associated generator, storage battery, transformer, and switchgear areas. (CMP-4)

**Electric Vehicle (EV).**

An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and electric motorcycles, 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 electric vehicles having a second source of motive power. (CMP-12)

Informational Note: Off-road, self-propelled electric mobile machines, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, and boats are not considered electric vehicles.

**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. (625) (CMP-12)

Informational Note: See 625.48 for further information on interactive systems.

**Electric Vehicle Power Export Equipment (EVPE).**

The equipment, including the outlet on the vehicle, that is used to provide electrical power at voltages greater than or equal to 30 Vac or 60 Vdc to loads external to the vehicle, using the vehicle as the source of supply. (625) (CMP-12)

Informational Note: Electric vehicle power export equipment and electric vehicle supply equipment or wireless power transfer equipment are sometimes contained in one piece of equipment, sometimes referred to as a bidirectional electric vehicle supply equipment (EVSE) or bidirectional wireless power transfer equipment (WPTE).

**Electric Vehicle Supply Equipment (EVSE).**

Equipment for plug-in charging, 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. (625) (CMP-12)

Informational Note: Electric vehicle power export equipment and electric vehicle supply equipment or wireless power transfer equipment (WPTE) are sometimes contained in one piece of equipment, sometimes referred to as a bidirectional EVSE or bidirectional WPTE.

**Electrical Circuit Protective System.**

A system consisting of components and materials intended for installation as protection for specific electrical wiring systems with respect to the disruption of electrical circuit integrity upon exterior fire exposure. (CMP-16)

**Electrical Datum Plane.**

A specified vertical distance above the normal high-water level at which electrical equipment can be installed and electrical connections can be made. (CMP-7)

**Electrical Ducts.**

Electrical conduits, or other raceways round in cross section, that are suitable for use underground or embedded in concrete. (CMP-6)

**Electrical Life Support Equipment.**

Electrically powered equipment whose continuous operation is necessary to maintain a patient's life. [ 99 :3.3.45] (517) (CMP-15)

**Electrical Resistance Trace Heating "60079-30-1".**

Type of protection for the purpose of producing heat on the principle of electrical resistance and typically composed of one or more metallic conductors and/or an electrically conductive material, suitably electrically insulated and protected. (CMP-14)

Informational Note: See ANSI/UL 60079-30-1, *Explosive Atmospheres — Part 30-1: Electrical Resistance Trace Heating — General and Testing Requirements*, for additional information.

**Electrically Connected.**

A connection capable of carrying current as distinguished from connection through electromagnetic induction. (668) (CMP-12)

### **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. (626) (CMP-12)

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. (626) (CMP-12)

### **Electrolyte.**

The medium that provides the ion transport mechanism between the positive and negative electrodes of a cell. (CMP-13)

### **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. (668) (CMP-12)

### **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. (668) (CMP-12)

### **Electronic Power Converter.**

A device that uses power electronics to convert one form of electrical power into another form of electrical power. (CMP-4)

Informational Note: Examples of electronic power converters include, but are not limited to, inverters, dc-to-dc converters, and electronic charge controllers. These devices have limited current capabilities based on the device ratings at continuous rated power.

### **Electronically Protected.**

A motor provided with electronic control that is an integral part of the motor and protects the motor against dangerous overheating due to failure of the electronic control, overload, and failure to start. (430) (CMP-11)

### **Emergency Luminaire, Battery-Equipped. (Battery-Equipped Emergency Luminaire)**

A luminaire with a rechargeable battery, a battery charging means, and an automatic load control relay. (CMP-13)

### **Emergency Luminaire, Directly Controlled. (Directly Controlled Emergency Luminaire)**

A luminaire supplied by the facility emergency power system and with a control input for dimming or switching that provides an emergency illumination level upon loss of normal power. (700) (CMP-13)

Informational Note: See ANSI/UL 924, *Emergency Lighting and Power Equipment*, for information covering directly controlled emergency luminaires.

### **Emergency Power Supply (EPS).**

The source(s) of electric power of the required capacity and quality for an emergency power supply system (EPSS). (CMP-13)



**Emergency Power Supply System (EPSS).**

A complete functioning EPS system coupled to a system of conductors, disconnecting means and overcurrent protective devices, transfer switches, and all control, supervisory, and support devices up to and including the load terminals of the transfer equipment needed for the system to operate as a safe and reliable source of electric power. [ 110: 3.3.4] (CMP-13)

**Emergency Systems.**

Those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction. These systems are intended to automatically supply illumination, power, or both, to designated areas and equipment in the event of failure of the normal supply or in the event of accident to elements of a system intended to supply, distribute, and control power and illumination essential for safety to human life. (CMP-13)

**Encapsulation “m”.**

Type of protection where electrical parts that could ignite an explosive atmosphere by either sparking or heating are enclosed in a compound in such a way that this explosive atmosphere cannot be ignited. (CMP-14)

Informational Note: See ANSI/UL 60079-18, *Explosive atmospheres — Part 18: Equipment protection by encapsulation “m”*, for additional information.

**Enclosed.**

Surrounded by a case, housing, fence, or wall(s) that prevents persons from accidentally contacting energized parts. (CMP-1)

**Enclosed-Break.**

Having electrical make-or-break contacts such that, if an internal explosion of the flammable gas or vapor that can enter it occurs, the device will withstand the internal explosion without suffering damage and without communicating the internal explosion to the external flammable gas or vapor.(CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Enclosure.**

The case or housing of apparatus, or the fence or walls surrounding an installation to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. (CMP-1)

Informational Note: See Table 110.28 for examples of enclosure types.

**Energized.**

Electrically connected to, or is, a source of voltage. (CMP-1)

**Energized, Likely to Become. (Likely to Become Energized)**

Conductive material that could become energized because of the failure of electrical insulation or electrical spacing. (CMP-5)

**Energy Management System (EMS).**

A system consisting of any of the following: a monitor(s), communications equipment, a controller(s), a timer(s), or other device(s) that monitors and/or controls an electrical load or a power production or storage source. (CMP-13)



**Energy Storage System (ESS).**

One or more devices installed as a system capable of storing energy and providing electrical energy into the premises wiring system or an electric power production and distribution network. (CMP-13)

Informational Note No. 1: An ESS(s) can include but is not limited to batteries, capacitors, and kinetic energy devices (e.g., flywheels and compressed air). An ESS(s) can include inverters or converters to change voltage levels or to make a change between an ac or a dc system.

Informational Note No. 2: These systems differ from a stationary standby battery installation where a battery spends the majority of the time on continuous float charge or in a high state of charge, in readiness for a discharge event.

**Entertainment Device.**

A mechanical or electromechanical device that provides an entertainment experience. (522) (CMP-15)

Informational Note: These devices can include animated props, show action equipment, animated figures, and special effects, coordinated with audio and lighting to provide an entertainment experience.

**Equipment.**

A general term, including fittings, devices, appliances, luminaires, apparatus, machinery, and the like used as a part of, or in connection with, an electrical installation. (CMP-1)

**Equipment, Mobile. (Mobile Equipment)**

Equipment with electrical components that is suitable to be moved only with mechanical aids or is provided with wheels for movement by a person(s) or powered devices. (513) (CMP-14)

**Equipment, Portable. (Portable Equipment)**

Equipment fed with portable cords or cables intended to be moved from one place to another. (640) (CMP-12)

**Equipment, Portable. (Portable Equipment)**

Equipment with electrical components suitable to be moved by a single person without mechanical aids. (511) (CMP-14)

**Equipment, Portable. (Portable Equipment)**

Equipment fed with portable cords or cables intended to be moved from one place to another. (520) (CMP-15)

**Equipment, Portable. (Portable Equipment)**

Equipment intended to be moved from one place to another. (530) (CMP-15)

**Equipment, Signal. (Signal Equipment)**

Includes audible and visual equipment such as chimes, gongs, lights, and displays that convey information to the user. (620) (CMP-12)

**Equipment Branch.**

A system of feeders and branch circuits arranged for delayed, automatic, or manual connection to the alternate power source and that serves primarily 3-phase power equipment. [ 99 :3.3.50] (517) (CMP-15)

**Equipment Protection Level (EPL).**

Level of protection assigned to equipment based on its likelihood of becoming a source of ignition, and distinguishing the differences between explosive gas atmospheres and explosive dust atmospheres. (CMP-14)

Informational Note: See ANSI/UL 60079-0, *Explosive Atmospheres — Part 0: Equipment — General Requirements*, for additional information.

**Equipment Rack.**

A framework for the support, enclosure, or both, of equipment; can be portable or stationary. (640) (CMP-12)

Informational Note: See EIA/ECA 310-E-2005, *Cabinets, Racks, Panels and Associated Equipment*, for examples of equipment racks.

**Equipotential Plane.**

Conductive parts bonded together to reduce voltage gradients in a designated area. (682) (CMP-17)

**Equipotential Plane.**

Conductive elements that are connected together to minimize voltage differences. (CMP-7)

**Essential Electrical System.**

A system comprised of alternate power sources and all connected distribution systems and ancillary equipment, designed to ensure continuity of electrical power to designated areas and functions of a health care facility during disruption of normal power sources, and also to minimize disruption within the internal wiring system. [ 99 :3.3.52] (517) (CMP-15)

**Explosionproof Equipment.**

Equipment enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that might occur within it, that is capable of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within, and that operates at such an external temperature that a surrounding flammable atmosphere will not be ignited. (CMP-14)

Informational Note No. 1: See ANSI/UL 1203, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations*, for additional information.

Informational Note No. 2: See NEMA 250, *Enclosures for Electrical Equipment (1000 Volts Maximum)*, for additional information on explosionproof enclosures that are sometimes additionally marked Type 7.

**Exposed (as applied to live parts).**

Capable of being inadvertently touched or approached nearer than a safe distance by a person. (CMP-1)

Informational Note: This term applies to parts that are not suitably guarded, isolated, or insulated.

**Exposed (as applied to wiring methods).**

On or attached to the surface or behind panels designed to allow access. (CMP-1)

**Exposed (Optical Fiber Cable Exposed to Accidental Contact).**

A conductive optical fiber cable in such a position that, in case of failure of supports or insulation, contact between the cable's non-current-carrying conductive members and an electrical circuit might result. (CMP-16)

**Exposed (to Accidental Contact).**

A circuit in such a position that, in case of failure of supports or insulation, contact with another circuit may result. (CMP-16)

**Exposed Conductive Surfaces.**

Those surfaces that are capable of carrying electric current and that are unprotected, uninsulated, unenclosed, or unguarded, permitting personal contact. [ 99: 3.3.54] (517) (CMP-15)

Informational Note: Paint, anodizing, and similar coatings are not considered suitable insulation, unless they are listed for such use.

**Externally Operable.**

Capable of being operated without exposing the operator to contact with live parts. (CMP-1)

**Facility, On-Site Power Production. (On-Site Power Production Facility)**

The normal supply of electric power for the site that is expected to be constantly producing power. (695) (CMP-13)

**Fastened-in-Place.**

Mounting means of equipment in which the fastening means are specifically designed to permit removal without the use of a tool. (625) (CMP-12)

**Fault-Managed Power (FMP).**

A powering system that monitors for faults and controls current delivered to ensure fault energy is limited. (726) (CMP-3)

Informational Note No. 1: The monitoring and control systems differentiate fault-managed power from electric light and power circuits; therefore, alternative requirements to those of Chapters 1 through 4 are given regarding minimum wire sizes, ampacity adjustment and correction factors, overcurrent protection, insulation requirements, and wiring methods and materials.

Informational Note No. 2: A fault-managed power circuit is also commonly referred to as a Class 4 circuit.

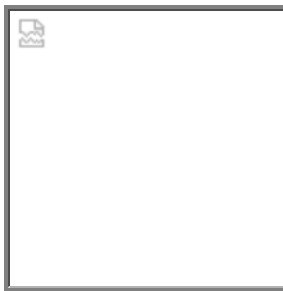
**Fault Current.**

The current delivered at a point on the system during a short-circuit condition. (CMP-10)

**Fault Current, Available. (Available Fault Current)**

The largest amount of current capable of being delivered at a point on the system during a short-circuit condition. (CMP-10)

Informational Note: A short-circuit can occur during abnormal conditions such as a fault between circuit conductors or a ground fault. See Informational Note Figure 100.1.

**Figure Informational Note Figure 100.1 Available Fault Current.****Fault Protection Device.**

An electronic device that is intended for the protection of personnel and functions under fault conditions, such as network-powered broadband communications cable short or open circuit, to limit the current or voltage, or both, for a low-power network-powered broadband communications circuit and provide acceptable protection from electric shock. (830) (CMP-16)

**Feeder.**

All circuit conductors between the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent device. (CMP-10)

### **Feeder Assembly.**

The overhead or under-chassis feeder conductors, including the equipment grounding conductor, together with the necessary fittings and equipment; or the power-supply cord assembly for a mobile home, recreational vehicle, or park trailer, identified for the delivery of energy from the source of electrical supply to the panelboard within the mobile home, recreational vehicle, or park trailer. (CMP-7)

### **Festoon Lighting.**

A string of outdoor lights that is suspended between two points. (CMP-18)

### **Fibers/Flyings, Combustible. (Combustible Fibers/Flyings)**

Fibers/flyings, where any dimension is greater than 500  $\mu\text{m}$  in nominal size, which can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature. [ **499:** 3.3.4.1] (CMP-14)

Informational Note No. 1: This definition and Informational Notes No. 2 and No. 3 have been extracted from NFPA 499-2021, *Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*. The NFPA 499 reference is in brackets. Only editorial changes were made to the extracted text to make it consistent with this *Code*.

Informational Note No. 2: Section 500.5(D) defines a Class III location. Combustible fibers/flyings can be similar in physical form to ignitable fibers/flyings and protected using the same electrical equipment installation methods. Examples of fibers/flyings include flat platelet-shaped particulate, such as metal flake, and fibrous particulate, such as particle board core material. If the smallest dimension of a combustible material is greater than 500  $\mu\text{m}$ , it is unlikely that the material would be combustible fibers/flyings, as determined by test. Finely divided solids with lengths that are large compared to their diameter or thickness usually do not pass through a 500  $\mu\text{m}$  sieve, yet when tested could potentially be determined to be explosible. [ **499:** A.3.3.4.1]

Informational Note No. 3: See ASTM E1226, *Standard Test Method for Explosibility of Dust Clouds*, ISO 6184-1, *Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air*, or ISO/IEC/UL 80079-20-2, *Explosive atmospheres — Part 20-2: Material characteristics — Combustible dusts test methods*, for procedures for determining the explosibility of dusts. A material that is found to not present an explosible mixture could still be an ignitable fiber/flying, as defined in this article. Historically, the explosibility condition has been described as presenting a flash fire or explosion hazard. It could be understood that the potential hazard due to the formation of an explosible mixture when suspended in air at standard atmospheric pressure and temperature would include ignition. [ **499:** A.3.3.4.1]

**Fibers/Flyings, Ignitable. (Ignitable Fibers/Flyings)**

Fibers/flyings where any dimension is greater than 500 µm in nominal size, which are not likely to be in suspension in quantities to produce an explosible mixture, but could produce an ignitable layer fire hazard. [ **499**: 3.3.4.2] (CMP-14)

Informational Note No. 1: This definition and Informational Note No. 2 have been extracted from NFPA 499-2021, *Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*. The NFPA 499 reference is in brackets. Only editorial changes were made to the extracted text to make it consistent with this *Code*.

Informational Note No. 2: Section 500.5 of this *Code* prescribes a Class III location as one where ignitable fibers/flyings are present, but not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures. This description addresses fibers/flyings that do not present a flash-fire hazard or explosion hazard by test. This could be because those fibers/flyings are too large or too agglomerated to be suspended in air in sufficient concentration, or at all, under typical test conditions. Alternatively, this could be because they burn so slowly that, when suspended in air, they do not propagate combustion at any concentration. In this document the zone classification system includes ignitable fibers/flyings as a fire hazard in a layer, which is not addressed in the IEC zone system (see IEC 60079-10-2, *Explosive atmospheres — Part 10-2: Classification of areas — Explosive dust atmospheres*). Where these are present, the user could also consider installation in accordance with Article 503 of this *Code*. [ **499**: A.3.3.4.2]

**Field Evaluation Body (FEB).**

An organization or part of an organization that performs field evaluations of electrical or other equipment. [ **790**: 3.3.4] (CMP-1)

Informational Note: See NFPA 790-2021, *Standard for Competency of Third-Party Field Evaluation Bodies*, provides guidelines for establishing the qualification and competency of a body performing field evaluations of electrical products and assemblies with electrical components.

**Field Labeled (as applied to evaluated products).**

Equipment or materials to which has been attached a label, symbol, or other identifying mark of an FEB indicating the equipment or materials were evaluated and found to comply with requirements as described in an accompanying field evaluation report. [ **790**: 3.3.6] (CMP-1)

**Fire Alarm Circuit.**

The portion of the wiring system between the load side of the overcurrent device or the power-limited supply and the connected equipment of all circuits powered and controlled by the fire alarm system. Fire alarm circuits are classified as either non-power-limited or power-limited. (CMP-3)

**Fire Alarm Circuit, Non-Power-Limited (NPLFA). (Non-Power-Limited Fire Alarm Circuit)**

A fire alarm circuit powered by a source that is not power limited. (CMP-3)

Informational Note: See 760.41 and 760.43 for requirements for non-power-limited fire alarm circuits.

**Fire Alarm Circuit, Power-Limited (PLFA). (Power-Limited Fire Alarm Circuit)**

A fire alarm circuit powered by a power-limited source. (CMP-3)

Informational Note: See 760.121 for requirements on power-limited fire alarm circuits.

**Fitting.**

An accessory such as a locknut, bushing, or other part of a wiring system that is intended primarily to perform a mechanical rather than an electrical function. (CMP-1)

**Fixed (as applied to equipment).**

Equipment that is fastened or otherwise secured at a specific location. (680) (CMP-17)

**Fixed-in-Place.**

Mounting means of equipment using fasteners that require a tool for removal. (625) (CMP-12)

**Flameproof “d”.**

Type of protection where the enclosure will withstand an internal explosion of a flammable mixture that has penetrated into the interior, without suffering damage and without causing ignition, through any joints or structural openings in the enclosure of an external explosive gas atmosphere consisting of one or more of the gases or vapors for which it is designed. (CMP-14)

Informational Note: See ANSI/UL 60079-1, *Explosive Atmospheres — Part 1: Equipment Protection by Flameproof Enclosures “d”*, for additional information.

**Flammable Anesthetics.**

Gases or vapors, such as fluroxene, cyclopropane, divinyl ether, ethyl chloride, ethyl ether, and ethylene, that could form flammable or explosive mixtures with air, oxygen, or reducing gases such as nitrous oxide. (517) (CMP-15)

**Flexible Bus Systems.**

An assembly of flexible insulated bus, with a system of associated fittings used to secure, support, and terminate the bus. (CMP-8)

Informational Note: Flexible bus systems are engineered systems for a specific site location and are ordinarily assembled at the point of installation from the components furnished or specified by the manufacturer.

**Flexible Insulated Bus.**

A flexible rectangular conductor with an overall insulation. (CMP-8)

**Flywheel ESS (FESS).**

A mechanical ESS composed of a spinning mass referred to as a rotor and an energy conversion mechanism such as a motor-generator that converts the mechanical energy to electrical energy. (706) (CMP-13)

Informational Note: There are primarily two types of rotor constructions, solid metal mass design and composite fiber design.

**Footlight.**

A border light installed on or in the stage. (520) (CMP-15)

**Forming Shell.**

A structure designed to support a wet-niche luminaire assembly and intended for mounting in a pool or fountain structure. (680) (CMP-17)

**Fountain.**

An ornamental structure or recreational water feature from which one or more jets or streams of water are discharged into the air, including splash pads, ornamental pools, display pools, and reflection pools. The definition does not include drinking water fountains or water coolers. (680) (CMP-17)

**Frame.**

Chassis rail and any welded addition thereto of metal thickness of 1.35 mm (0.053 in.) or greater. (551) (CMP-7)

**Free Air (as applied to conductors).**

Open or ventilated environment that allows for heat dissipation and air flow around an installed conductor. (CMP-6)



**Fuel Cell.**

An electrochemical system that consumes fuel to produce an electric current. In such cells, the main chemical reaction used for producing electric power is not combustion. However, there may be sources of combustion used within the overall cell system, such as reformers/fuel processors. (CMP-4)

**Fuel Cell System.**

The complete aggregate of equipment used to convert chemical fuel into usable electricity and typically consisting of a reformer, stack, power inverter, and auxiliary equipment. (CMP-4)

**Fuse.**

An overcurrent protective device with a circuit-opening fusible part that is heated and severed by the passage of overcurrent through it. (CMP-10)

Informational Note: A fuse comprises all the parts that form a unit capable of performing the prescribed functions. It may or may not be the complete device necessary to connect it into an electrical circuit.

**Fuse, Electronically Actuated. (Electronically Actuated Fuse)**

An overcurrent protective device that generally consists of a control module that provides current-sensing, electronically derived time-current characteristics, energy to initiate tripping, and an interrupting module that interrupts current when an overcurrent occurs. Such fuses may or may not operate in a current-limiting fashion, depending on the type of control selected. (CMP-10)

**Fuse, Expulsion. (Expulsion Fuse)**

A vented fuse unit in which the expulsion effect of gases produced by the arc and lining of the fuseholder, either alone or aided by a spring, extinguishes the arc. (CMP-10)

**Fuse, Nonvented Power. (Nonvented Power Fuse)**

A fuse without intentional provision for the escape of arc gases, liquids, or solid particles to the atmosphere during circuit interruption. (CMP-10)

**Fuse, Power. (Power Fuse)**

A vented, nonvented, or controlled vented fuse unit in which the arc is extinguished by being drawn through solid material, granular material, or liquid, either alone or aided by a spring. (CMP-10)

**Fuse, Vented Power. (Vented Power Fuse)**

A fuse with provision for the escape of arc gases, liquids, or solid particles to the surrounding atmosphere during circuit interruption. (CMP-10)

**Garage.**

A building or portion of a building in which one or more self-propelled vehicles can be kept for use, sale, storage, rental, repair, exhibition, or demonstration purposes. (CMP-1)

Informational Note: See 511.1 for commercial garages, repair and storage.

**Garage, Major Repair. (Major Repair Garage)**

A building or portions of a building where major repairs, such as engine overhauls, painting, body and fender work, welding or grinding, and repairs that require draining or emptying of the motor vehicle fuel tank are performed on motor vehicles, including associated floor space used for offices, parking, or showrooms. [ **30A:** 3.3.12.1] (CMP-14)

**Garage, Minor Repair. (Minor Repair Garage)**

A building or portions of a building used for lubrication, inspection, and minor automotive maintenance work, such as engine tune-ups, replacement of parts, fluid changes (e.g., oil, antifreeze, transmission fluid, brake fluid, air-conditioning refrigerants), brake system repairs, tire rotation, and similar routine maintenance work, including the associated floor space used for offices, parking, or showrooms. [ **30A:** 3.3.12.2] (CMP-14)



**General-Purpose Cables, Cable Routing Assemblies, and Raceways.**

Cables, cable routing assemblies, and raceways are suitable for general-purpose applications and are resistant to the spread of fire. (722) (CMP-3)

**Generating Capacity, Inverter. (Inverter Generating Capacity)**

The sum of parallel-connected inverter maximum continuous output power at 40°C in watts, kilowatts, volt-amperes, or kilovolt-amperes. (CMP-4)

**Generating Station.**

A plant wherein electric energy is produced by conversion from some other form of energy (e.g., chemical, nuclear, solar, wind, mechanical, or hydraulic) by means of suitable apparatus. (CMP-4)

**Generator (Generator Set).**

A machine that converts mechanical energy into electrical energy by means of a prime mover and alternator and/or inverter. (CMP-13)

**Generator, On-Site Standby. (On-Site Standby Generator)**

A facility producing electric power on site as the alternate supply of electric power. It differs from an on-site power production facility in that it is not constantly producing power. (695) (CMP-13)

**Grid Bus Rail.**

A combination of the busbar, the busbar support, and the structural suspended ceiling grid system. (393) (CMP-18)

**Ground.**

The earth. (CMP-5)

**Ground Fault.**

An unintentional, electrically conductive connection between an ungrounded conductor of an electrical circuit and the normally non-current-carrying conductors, metal enclosures, metal raceways, metal equipment, or earth. (CMP-5)

**Ground-Fault Circuit Interrupter (GFCI).**

A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a ground-fault current exceeds the values established for a Class A device. (CMP-2)

Informational Note: See UL 943, *Standard for Ground-Fault Circuit Interrupters*, for further information. Class A ground-fault circuit interrupters trip when the ground-fault current is 6 mA or higher and do not trip when the ground-fault current is less than 4 mA.

**Ground-Fault Circuit Interrupter, Special Purpose (SPGFCI). (Special Purpose Ground-Fault Circuit Interrupter)**

A device intended for the detection of ground-fault currents, used in circuits with voltage to ground greater than 150 volts, that functions to de-energize a circuit or portion of a circuit within an established period of time when a ground-fault current exceeds the values established for Class C, D, or E devices. (CMP-2)

Informational Note: See UL 943C, *Outline of Investigation for Special Purpose Ground-Fault Circuit Interrupters*, for information on Classes C, D, or E special purpose ground-fault circuit interrupters.

**Ground-Fault Current Path.**

An electrically conductive path from the point of a ground fault on a wiring system through normally non-current-carrying conductors, grounded conductors, equipment, or the earth to the electrical supply source. (CMP-5)

Informational Note: Examples of ground-fault current paths are any combination of equipment grounding conductors, metallic raceways, metallic cable sheaths, electrical equipment, and any other electrically conductive material such as metal, water, and gas piping; steel framing members; stucco mesh; metal ducting; reinforcing steel; shields of communications cables; grounded conductors; and the earth itself.

**Ground-Fault Current Path, Effective. (Effective Ground-Fault Current Path)**

An intentionally constructed, low-impedance electrically conductive path designed and intended to carry current during ground-fault events from the point of a ground fault on a wiring system to the electrical supply source and that facilitates the operation of the overcurrent protective device or ground-fault detectors. (CMP-5)

**Ground-Fault Detector-Interrupter, dc (GFDI).**

A device that provides protection for PV system dc circuits by detecting a ground fault and could interrupt the fault path in the dc circuit. (690) (CMP-4)

Informational Note: See UL 1741, *Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources*, and UL 62109, *Standard for Power Converters for use in Photovoltaic Power Systems*, for further information on GFDI equipment.

**Ground-Fault Protection of Equipment (GFPE).**

A system intended to provide protection of equipment from damaging line-to-ground fault currents by operating to cause a disconnecting means to open all ungrounded conductors of the faulted circuit. This protection is provided at current levels less than those required to protect conductors from damage through the operation of a supply circuit overcurrent device. (CMP-5)

**Grounded (Grounding).**

Connected (connecting) to ground or to a conductive body that extends the ground connection. (CMP-5)

**Grounded, Functionally. (Functionally Grounded)**

A system that has an electrical ground reference for operational purposes that is not solidly grounded. (CMP-4)

Informational Note: A functionally grounded system is often connected to ground through an electronic means internal to an inverter or charge controller that provides ground-fault protection. Examples of operational purposes for functionally grounded systems include ground-fault detection and performance-related issues for some power sources.

**Grounded, Solidly. (Solidly Grounded)**

Connected to ground without inserting any resistor or impedance device. (CMP-5)

**Grounded Conductor.**

A system or circuit conductor that is intentionally grounded. (CMP-5)

Informational Note: Although an equipment grounding conductor is grounded, it is not considered a grounded conductor.

**Grounded System, Impedance. (Impedance Grounded System)**

An electrical system that is grounded by intentionally connecting the system neutral point to ground through an impedance device. (CMP-5)

**Grounding Conductor, Equipment (EGC). (Equipment Grounding Conductor)**

A conductive path(s) that is part of an effective ground-fault current path and connects normally non-current-carrying metal parts of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both. (CMP-5)

Informational Note No. 1: It is recognized that the equipment grounding conductor also performs bonding.

Informational Note No. 2: See 250.118 for a list of acceptable equipment grounding conductors.

**Grounding Conductor, Impedance. (Impedance Grounding Conductor)**

A conductor that connects the system neutral point to the impedance device in an impedance grounded system. (CMP-5)

**Grounding Electrode.**

A conducting object through which a direct connection to earth is established. (CMP-5)

**Grounding Electrode Conductor (GEC).**

A conductor used to connect the system grounded conductor or the equipment to a grounding electrode or to a point on the grounding electrode system. (CMP-5)

**Grouped.**

Cables or conductors positioned adjacent to one another but not in continuous contact with each other. (520) (CMP-15)

**Guarded.**

Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats, or platforms to remove the likelihood of approach or contact by persons or objects to a point of danger. (CMP-1)

**Guest Room.**

An accommodation combining living, sleeping, sanitary, and storage facilities within a compartment. (CMP-2)

**Guest Suite.**

An accommodation with two or more contiguous rooms comprising a compartment, with or without doors between such rooms, that provides living, sleeping, sanitary, and storage facilities. (CMP-2)

**Gutter, Metal Auxiliary. (Metal Auxiliary Gutter)**

A sheet metal enclosure used to supplement wiring spaces at meter centers, distribution centers, switchgear, switchboards, and similar points of wiring systems. The enclosure has hinged or removable covers for housing and protecting electrical wires, cable, and busbars. The enclosure is designed for conductors to be laid or set in place after the enclosures have been installed as a complete system. (CMP-8)

**Gutter, Nonmetallic Auxiliary. (Nonmetallic Auxiliary Gutter)**

A flame-retardant, nonmetallic enclosure used to supplement wiring spaces at meter centers, distribution centers, switchgear, switchboards, and similar points of wiring systems. The enclosure has hinged or removable covers for housing and protecting electrical wires, cable, and busbars. The enclosure is designed for conductors to be laid or set in place after the enclosures have been installed as a complete system. (CMP-8)

**Habitable Room.**

A room in a building for living, sleeping, eating, or cooking, but excluding bathrooms, toilet rooms, closets, hallways, storage or utility spaces, and similar areas. (CMP-2)

**Handhole Enclosure.**

An enclosure for use in underground systems, provided with an open or closed bottom, and sized to allow personnel to reach into, but not enter, for the purpose of installing, operating, or maintaining equipment or wiring or both. (CMP-9)

**Hazard Current.**

For a given set of connections in an isolated power system, the total current that would flow through a low impedance if it were connected between either isolated conductor and ground. [99:3.3.72] (517) (CMP-15)

**Hazard Current, Fault. (Fault Hazard Current)**

The hazard current of a given isolated power system with all devices connected except the line isolation monitor. [ 99: 3.3.72.1] (517) (CMP-15)

**Monitor Hazard Current.**

The hazard current of the line isolation monitor alone. [ 99: 3.3.72.2] (517) (CMP-15)

**Total Hazard Current.**

The hazard current of a given isolated system with all devices, including the line isolation monitor, connected. [ 99: 3.3.72.3] (517) (CMP-15)

**Header.**

Transverse metal raceways for electrical conductors, providing access to predetermined cells of a precast cellular concrete floor, thereby permitting the installation of electrical conductors from a distribution center to the floor cells. (CMP-8)

**Health Care Facilities.**

Buildings, portions of buildings, or mobile enclosures in which human medical, dental, psychiatric, nursing, obstetrical, or surgical care is provided. [ 99: 3.3.73] (CMP-15)

Informational Note: Examples of health care facilities include, but are not limited to, hospitals, nursing homes, limited care facilities, clinics, medical and dental offices, and ambulatory care centers, whether permanent or movable.

**Health Care Facility's Governing Body.**

The person or persons who have the overall legal responsibility for the operation of a health care facility. [ 99: 3.3.74] (517) (CMP-15)

**Heating Equipment.**

Any equipment that is used for heating purposes and whose heat is generated by induction or dielectric methods. (665) (CMP-12)

**Heating Panel.**

A complete assembly provided with a junction box or a length of flexible conduit for connection to a branch circuit. (CMP-17)

**Heating Panel Set.**

A rigid or nonrigid assembly provided with nonheating leads or a terminal junction assembly identified as being suitable for connection to a wiring system. (CMP-17)

**Heating System.**

A complete system consisting of components such as heating elements, fastening devices, nonheating circuit wiring, leads, temperature controllers, safety signs, junction boxes, raceways, and fittings. (426) (CMP-17)

**Heating System, Impedance. (Impedance Heating System)**

A system in which heat is generated in an object, such as a pipe, rod, or combination of such objects serving as a heating element, by causing current to flow through such objects by direct connection to an ac voltage source from an isolating transformer. In some installations the object is embedded in the surface to be heated or constitutes the exposed component to be heated. (CMP-17)

**Heating System, Induction. (Induction Heating System)**

A system in which heat is generated in a pipeline or vessel wall by inducing current in the pipeline or vessel wall from an external isolated ac field source. (CMP-17)

**Heating System, Skin Effect. (Skin-Effect Heating System)**

A system in which heat is generated on the inner surface of a ferromagnetic envelope embedded in or fastened to the surface to be heated.

Informational Note: Typically, an electrically insulated conductor is routed through and connected to the envelope at the other end. The envelope and the electrically insulated conductor are connected to an ac voltage source from an isolating transformer. (CMP-17)

**Hermetic Refrigerant Motor-Compressor.**

A combination consisting of a compressor and motor, both of which are enclosed in the same housing, with no external shaft or shaft seals, with the motor operating in the refrigerant. (CMP-11)

**Hoistway.**

Any shaftway, hatchway, well hole, or other vertical opening or space in which an elevator or dumbwaiter is designed to operate. (CMP-12)

**Hospital.**

A building or portion thereof used on a 24-hour basis for the medical, psychiatric, obstetrical, or surgical care of four or more inpatients. [ **101** : 3.3.152] (CMP-15)

**Host Sign.**

A sign or outline lighting system already installed in the field that is designated for field conversion of the illumination system with a retrofit kit. (600) (CMP-18)

**Hydromassage Bathtub.**

A permanently installed bathtub equipped with a recirculating piping system, pump, and associated equipment. It is designed so it can accept, circulate, and discharge water upon each use. (680) (CMP-17)

**Identified (as applied to equipment).**

Recognizable as suitable for the specific purpose, function, use, environment, application, and so forth, where described in a particular Code requirement. (CMP-1)

Informational Note: Some examples of ways to determine suitability of equipment for a specific purpose, environment, or application include investigations by a qualified testing laboratory (listing and labeling), an inspection agency, or other organizations concerned with product evaluation.

**In Sight From (Within Sight From) (Within Sight).**

Equipment that is visible and not more than 15 m (50 ft) distant from other equipment is *in sight from* that other equipment. (CMP-1)

Informational Note: See 110.29 for additional information.

**Increased Safety “e”.**

Type of protection applied to electrical equipment that does not produce arcs or sparks in normal service and under specified abnormal conditions, in which additional measures are applied to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks. (CMP-14)

Informational Note: See ANSI/UL 60079-7, *Explosive Atmospheres — Part 7: Equipment Protection by Increased Safety “e”*, for additional information.

**Induction Heating (Induction Melting) (Induction Welding).**

The heating, melting, or welding of a nominally conductive material due to its own I<sup>2</sup>R losses when the material is placed in a varying electromagnetic field. (665) (CMP-12)

**Industrial Control Panel.**

An assembly of two or more components consisting of one of the following: (1) power circuit components only, such as motor controllers, overload relays, fused disconnect switches, and circuit breakers; (2) control circuit components only, such as push buttons, pilot lights, selector switches, timers, switches, and control relays; (3) a combination of power and control circuit components. These components, with associated wiring and terminals, are mounted on, or contained within, an enclosure or mounted on a subpanel. (CMP-11)

Informational Note: The industrial control panel does not include the controlled equipment.

**Industrial Installation, Supervised. (Supervised Industrial Installation)**

The industrial portions of a facility where all of the following conditions are met:

- (1) Conditions of maintenance and engineering supervision ensure that only qualified persons monitor and service the system.
- (2) The premises wiring system has 2500 kVA or greater of load used in industrial process(es), manufacturing activities, or both, as calculated in accordance with Article 220.
- (3) The premises has at least one service or feeder that is more than 150 volts to ground and more than 300 volts phase-to-phase.

This definition excludes installations in buildings used by the industrial facility for offices, warehouses, garages, machine shops, and recreational facilities that are not an integral part of the industrial plant, substation, or control center. (240) (CMP-10)

**Information Technology Equipment (ITE).**

Equipment and systems rated 1000 volts or less, normally found in offices or other business establishments and similar environments classified as ordinary locations, that are used for creation and manipulation of data, voice, video, and similar signals that are not communications equipment and do not process communications circuits. (CMP-12)

Informational Note: See UL 60950-1, *Information Technology Equipment — Safety — Part 1: General Requirements*, or UL 62368-1, *Audio/Video Information and Communication Technology Equipment Part 1: Safety Requirements*, for information on listing requirements for both information technology equipment and communications equipment.

**Information Technology Equipment Room.**

A room within the information technology equipment area that contains the information technology equipment. [ 75: 3.3.15] (CMP-12)

**Innerduct.**

A nonmetallic raceway placed within a larger raceway. (CMP-16)



**Insulated Bus Pipe (IBP).**

A cylindrical solid or hollow conductor with a solid insulation system, having conductive grading layers and a grounding layer imbedded in the insulation, and provided with an overall covering of insulating or metallic material. IBP is also referred to as tubular covered conductor (TCC). (CMP-8)

**Insulated Bus Pipe System.**

An assembly that includes bus pipe, connectors, fittings, mounting structures, and other fittings and accessories. (CMP-8)

**Insulating End.**

An insulator designed to electrically insulate the end of a flat conductor cable (Type FCC). (324) (CMP-6)

**Interactive Mode.**

The operating mode for power production equipment or microgrids that operate in parallel with and are capable of delivering energy to an electric power production and distribution network or other primary source. (CMP-4)

Informational Note: Interactive mode is an operational mode of both interactive systems and of equipment such as interactive inverters.

**Interrupting Rating.**

The highest current at rated voltage that a device is identified to interrupt under standard test conditions. (CMP-10)

Informational Note: Equipment intended to interrupt current at other than fault levels may have its interrupting rating implied in other ratings, such as horsepower or locked rotor current.

**Intersystem Bonding Termination (IBT).**

A device that provides a means for connecting intersystem bonding conductors for communications systems to the grounding electrode system. (CMP-16)

**Intrinsic Safety “i”.**

Type of protection where any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under prescribed test conditions. (CMP-14)

Informational Note: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*; and ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”*, for additional information.

**Intrinsically Safe Apparatus.**

Apparatus in which all the circuits are intrinsically safe. (CMP-14)

Informational Note No. 1: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*, and ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”*, for additional information.

Informational Note No. 2: See ANSI/ISA RP 12.06.01, *Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation — Part 1: Intrinsic Safety*, for installation information.

**Intrinsically Safe Circuit.**

A circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under prescribed test conditions. (CMP-14)

Informational Note: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*, and ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”*, for test conditions.



**Intrinsically Safe Circuits, Different. (Different Intrinsically Safe Circuits)**

Intrinsically safe circuits in which the possible interconnections have not been evaluated and identified as intrinsically safe. (CMP-14)

Informational Note: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*, and ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”*, for additional information.

**Intrinsically Safe System.**

An assembly of interconnected intrinsically safe apparatus, associated apparatus, and interconnecting cables, in which those parts of the system that might be used in hazardous (classified) locations are intrinsically safe circuits. (CMP-14)

Informational Note No. 1: An intrinsically safe system might include more than one intrinsically safe circuit.

Informational Note No. 2: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*; ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”*; and ANSI/UL 60079-25, *Explosive Atmospheres — Part 25: Intrinsically Safe Electrical Systems*, for additional information.

Informational Note No. 3: See ANSI/ISA RP 12.06.01, *Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation — Part 1: Intrinsic Safety*, for installation information.

**Invasive Procedure.**

Any procedure that penetrates the protective surfaces of a patient's body (i.e., skin, mucous membrane, cornea) and that is performed with an aseptic field (procedural site). [Not included in this category are placement of peripheral intravenous needles or catheters used to administer fluids and/or medications, gastrointestinal endoscopies (i.e., sigmoidoscopies), insertion of urethral catheters, and other similar procedures.] [ 99: 3.3.91] (517) (CMP-15)

**Inverter.**

Equipment that changes dc to ac. (CMP-4)

**Inverter, Interactive. (Interactive Inverter)**

Inverter equipment having the capability to operate only in interactive mode. (CMP-13)

**Inverter, Multimode. (Multimode Inverter)**

Inverter equipment capable of operating in both interactive and island modes. (CMP-4)

**Inverter, Stand-alone. (Stand-alone Inverter)**

Inverter equipment having the capabilities to operate only in island mode. (CMP-4)

**Inverter Input Circuit.**

Conductors connected to the dc input of an inverter. (CMP-13)

**Inverter Output Circuit.**

Conductors connected to the ac output of an inverter. (CMP-13)

**Inverter Utilization Output Circuit.**

Conductors between the multimode or stand-alone inverter and utilization equipment. (706) (CMP-13)

**Irrigation Machine.**

An electrically driven or controlled machine, with one or more motors, not hand-portable, and used primarily to transport and distribute water for agricultural purposes. (675) (CMP-7)

**Irrigation Machine, Center Pivot. (Center Pivot Irrigation Machine)**

A multimotored irrigation machine that revolves around a central pivot and employs alignment switches or similar devices to control individual motors. (675) (CMP-7)

**Island Mode.**

The operating mode for power production equipment or microgrids that allows energy to be supplied to loads that are disconnected from an electric power production and distribution network or other primary power source. (CMP-4)

**Isolated (as applied to location).**

Not readily accessible to persons unless special means for access are used. (CMP-1)

**Isolated Power System.**

A system comprising an isolation transformer or its equivalent, a line isolation monitor, and its ungrounded circuit conductors. [ 99: 3.3.93] (517) (CMP-15)

**Isolation Transformer.**

A transformer of the multiple-winding type, with the primary and secondary windings physically separated, that inductively couples its ungrounded secondary winding to the grounded feeder system that energizes its primary winding. [ 99: 3.3.94] (517) (CMP-15)

**Kitchen.**

An area with a sink and permanent provisions for food preparation and cooking. (CMP-2)

**Labeled.**

Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner. (CMP-1)

Informational Note: If a listed product is of such a size, shape, material, or surface texture that it is not possible to apply legibly the complete label to the product, the complete label may appear on the smallest unit container in which the product is packaged.

**Laundry Area.**

An area containing or designed to contain a laundry tray, clothes washer, or clothes dryer. (CMP-2)

**Leakage-Current Detector-Interrupter (LCDI).**

A device provided in a power supply cord or cord set that senses leakage current flowing between or from the cord conductors and interrupts the circuit at a predetermined level of leakage current. (440) (CMP-11)

**LED Sign Illumination System.**

A complete lighting system for use in signs and outline lighting consisting of light-emitting diode (LED) light sources, power supplies, wire, and connectors to complete the installation. (600) (CMP-18)

**Legally Required Standby Systems.**

Those systems required and so classed as legally required standby by municipal, state, federal, or other codes or by any governmental agency having jurisdiction. These systems are intended to automatically supply power to selected loads (other than those classed as emergency systems) in the event of failure of the normal source. (CMP-13)

**Life Safety Branch.**

A system of feeders and branch circuits supplying power for lighting, receptacles, and equipment essential for life safety that is automatically connected to alternate power sources by one or more transfer switches during interruption of the normal power source. [ **99:** 3.3.97] (517) (CMP-15)

**Lighting Assembly, Cord-and-Plug-Connected. (Cord-and-Plug-Connected Lighting Assembly)**

A lighting assembly consisting of a luminaire intended for installation in the wall of a spa, hot tub, or storable pool, and a cord-and-plug-connected transformer or power supply. (680) (CMP-17)

**Lighting Assembly, Through-Wall. (Through-Wall Lighting Assembly)**

A lighting assembly intended for installation above grade, on or through the wall of a pool, consisting of two interconnected groups of components separated by the pool wall. (680) (CMP-17)

**Lighting Outlet.**

An outlet intended for the direct connection of a lampholder or luminaire. (CMP-18)

**Lighting Track. (Track Lighting)**

A manufactured assembly designed to support and energize luminaires that are capable of being readily repositioned on the track. Its length can be altered by the addition or subtraction of sections of track. (CMP-18)

**Limited Care Facility.**

A building or portion of a building used on a 24-hour basis for the housing of four or more persons who are incapable of self-preservation because of age; physical limitation due to accident or illness; or limitations such as intellectual disability/developmental disability, mental illness, or chemical dependency. [ **101:** 3.3.93.2] (CMP-15)

**Limited Finishing Workstation.**

A power-ventilated apparatus that is capable of confining the vapors, mists, residues, dusts, or deposits that are generated by a limited spray application process. Such apparatus is not a spray booth or spray room, as herein defined. [ **33:** 3.3.23.1] (CMP-14)

Informational Note: See NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials*, Section 14.3, for information on limited finishing workstations.

**Line Isolation Monitor.**

A test instrument designed to continually check the balanced and unbalanced impedance from each line of an isolated circuit to ground and equipped with a built-in test circuit to exercise the alarm without adding to the leakage current hazard. [ **99:** 3.3.99] (517) (CMP-15)

**Liquid Immersion “o”.**

Type of protection where electrical equipment is immersed in a protective liquid so that an explosive atmosphere that might be above the liquid or outside the enclosure cannot be ignited. (CMP-14)

Informational Note: See ANSI/UL 60079-6, *Explosive Atmospheres — Part 6: Equipment Protection by Liquid Immersion “o”*, for additional information.

**Listed.**

Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose. (CMP-1)

Informational Note: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. Use of the system employed by the listing organization allows the authority having jurisdiction to identify a listed product.

**Live Parts.**

Energized conductive components. (CMP-1)

**Load Management.**

The process within an energy management system that limits the total electrical load on an electrical supply system to a set value by adjusting or controlling the individual loads. (625) (CMP-12)

Informational Note: Load management is sometimes called *demand-side management* (DSM).

**Location, Anesthetizing. (Anesthetizing Location)**

Any space within a facility that has been designated for the administration of any flammable or nonflammable inhalation anesthetic agent during examination or treatment, including the use of such agents for relative analgesia. (517) (CMP-15)

**Location, Anesthetizing, Flammable. (Flammable Anesthetizing Location)**

Any area of the facility that has been designated to be used for the administration of any flammable inhalation anesthetic agents in the normal course of examination or treatment. (517) (CMP-15)

**Location, Damp. (Damp Location)**

Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture. (CMP-1)

Informational Note: Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold-storage warehouses.

**Location, Dry. (Dry Location)**

A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction. (CMP-1)

**Location, Remote. (Remote Location)**

A location, other than a motion picture or television studio, where a production is filmed or recorded. (530) (CMP-15)

**Location, Wet. (Wet Location)**

A location that is one or more of the following:

- (1) Unprotected and exposed to weather
- (2) Subject to saturation with water and other liquids
- (3) Underground
- (4) In concrete slabs or masonry in direct contact with the earth

(CMP-1)

Informational Note: A vehicle washing area is an example of a wet location saturated with water or other liquids.

**Location, Wet Procedure. (Wet Procedure Location)**

The area in a patient care space where a procedure is performed that is normally subject to wet conditions while patients are present, including standing fluids on the floor or drenching of the work area, either of which condition is intimate to the patient or staff. [ 99: 3.3.187] (517)  
(CMP-15)

Informational Note: Routine housekeeping procedures and incidental spillage of liquids do not define a wet procedure location. [ 99: A.3.3.187]

**Locations, Hazardous (Classified). [Hazardous (Classified) Locations]**

Locations where fire or explosion hazards might exist due to flammable gases, flammable liquid-produced vapors, combustible liquid-produced vapors, combustible dusts, combustible fiber/flyings, or ignitable fibers/flyings. (CMP-14)

**Locations, Unclassified. (Unclassified Locations)**

Locations determined to be neither Class I, Division 1; Class I, Division 2; Zone 0; Zone 1; Zone 2; Class II, Division 1; Class II, Division 2; Class III, Division 1; Class III, Division 2; Zone 20; Zone 21; Zone 22; nor any combination thereof. (CMP-14)

**Long-Time Rating.**

A rating based on an operating interval of 5 minutes or longer. (660) (CMP-12)

**Long-Time Rating (Standby Power).**

A rating based on an operating interval of 5 minutes or longer. (517) (CMP-15)

**Loudspeaker (Speaker).**

Equipment that converts an ac electric signal into an acoustic signal. (640) (CMP-12)

**Low-Voltage Contact Limit.**

A voltage not exceeding the following values:

- (1) 15 volts (RMS) for sinusoidal ac
- (2) 21.2 volts peak for nonsinusoidal ac
- (3) 30 volts for continuous dc
- (4) 12.4 volts peak for dc that is interrupted at a rate of 10 to 200 Hz

(680) (CMP-17)

**Low-Voltage Suspended Ceiling Power Distribution System.**

A system that serves as a support for a finished ceiling surface and consists of a busbar and busbar support system to distribute power to utilization equipment supplied by a Class 2 power supply. (393) (CMP-18)

**Luminaire.**

A complete lighting unit consisting of a light source such as a lamp or lamps, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light. A lampholder itself is not a luminaire. (CMP-18)

**Luminaire, Dry-Niche. (Dry-Niche Luminaire)**

A luminaire intended for installation in the floor or wall of a pool, spa, or fountain in a niche that is sealed against the entry of water. (680) (CMP-17)

**Luminaire, No-Niche. (No-Niche Luminaire)**

A luminaire intended for installation above or below the water without a niche. (680) (CMP-17)

**Luminaire, Wet-Niche. (Wet-Niche Luminaire)**

A luminaire intended for installation in a forming shell mounted in a pool or fountain structure where the luminaire will be completely surrounded by water. (680) (CMP-17)

**Machine Room.**

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. (620) (CMP-12)

**Machine Room and Control Room, Remote. (Remote Machine Room and Control Room)**

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. (620) (CMP-12)

**Machinery, Industrial (Industrial Machine). (Industrial Machinery)**

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. (CMP-12)

**Machinery Space.**

A space inside or outside the hoistway, intended to be accessed with or without full bodily entry, that contains the elevator, dumbwaiter, platform lift, or stairway chairlift equipment and could also contain equipment used directly in connection with the elevator, dumbwaiter, platform lift, or stairway chairlift. (620) (CMP-12)

**Machinery Space and Control Space, Remote. (Remote Machinery Space and Control Space)**

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. (620) (CMP-12)



**Manufactured Home.**

A structure, transportable in one or more sections, which in the traveling mode is 2.4 m (8 ft) or more in width or 12.2 m (40 ft) or more in length, or when erected on site is 29.77 m<sup>2</sup> (320 ft<sup>2</sup>) or more is built on a permanent chassis and is designed to be used as a dwelling with or without a permanent foundation, whether or not connected to the utilities, and includes plumbing, heating, air conditioning, and electrical systems contained therein. The term includes any structure that meets all the requirements of this paragraph except the size requirements and with respect to which the manufacturer voluntarily files a certification required by the regulatory agency. Calculations used to determine the number of square meters (square feet) in a structure are based on the structure's exterior dimensions and include all expandable rooms, cabinets, and other projections containing interior space, but do not include bay windows. [ **501:** 1.2.12] (CMP-7)

Informational Note No. 1: Unless otherwise indicated, the term *mobile home* includes manufactured home and excludes park trailers.

Informational Note No. 2: See the applicable building code for definition of the term *permanent foundation*.

Informational Note No. 3: See 24 CFR Part 3280, *Manufactured Home Construction and Safety Standards, of the Federal Department of Housing and Urban Development*, for additional information on the definition.

**Manufactured Wiring System.**

A system containing component parts that are assembled in the process of manufacture and cannot be inspected at the building site without damage or destruction to the assembly and used for the connection of luminaires, utilization equipment, continuous plug-in type busways, and other devices. (604) (CMP-7)

**Marina.**

A facility, generally on the waterfront, that stores and services boats in berths, on moorings, and in dry storage or dry stack storage. [ **303:** 3.3.13] (555) (CMP-7)

**Maximum Output Power.**

The maximum power delivered by an amplifier into its rated load as determined under specified test conditions. (640) (CMP-12)

Informational Note: The maximum output power can exceed the manufacturer's rated output power for the same amplifier.

**Maximum Output Power.**

The maximum 1 minute average power output a wind turbine produces in normal steady-state operation (instantaneous power output can be higher). (694) (CMP-4)

**Maximum Voltage.**

The greatest difference in potential produced between any two conductors of a wind turbine circuit. (694) (CMP-4)

**Maximum Water Level.**

The highest level that water can reach before it spills out. (680) (CMP-17)

**Medical Office.**

A building or part thereof in which the following occur:

- (1) Examinations and minor treatments/procedures performed under the continuous supervision of a medical professional;
- (2) The use of limited to minimal sedation and treatment or procedures that do not render the patient incapable of self-preservation under emergency conditions; and
- (3) No overnight stays for patients or 24-hour operations.

[ 99: 3.3.110] (CMP-15)

**Membrane Enclosure.**

A temporary enclosure used for the spraying of workpieces that cannot be moved into a spray booth where open spraying is not practical due to proximity to other operations, finish quality, or concerns such as the collection of overspray. (CMP-14)

Informational Note: See NFPA 33, Standard for Spray Application Using Flammable or Combustible Materials, Chapter 18, for information on the construction and use of membrane enclosures.

**Messenger-Supported Wiring.**

An exposed wiring support system using a messenger wire to support insulated conductors by any one of the following:

- (1) A messenger with rings and saddles for conductor support
- (2) A messenger with a field-installed lashing material for conductor support
- (3) Factory-assembled aerial cable
- (4) Multiplex cables utilizing a bare conductor, factory assembled and twisted with one or more insulated conductors, such as duplex, triplex, or quadruplex type of construction

(CMP-6)

**Messenger Wire (Messenger).**

A wire that is run along with or integral with a cable or conductor to provide mechanical support for the cable or conductor. (CMP-6)

**Metal Shield Connections.**

Means of connection for flat conductor cables (Type FCC) designed to electrically and mechanically connect a metal shield to another metal shield, to a receptacle housing or self-contained device, or to a transition assembly. (324) (CMP-6)

**Microgrid.**

An electric power system capable of operating in island mode and capable of being interconnected to an electric power production and distribution network or other primary source while operating in interactive mode, which includes the ability to disconnect from and reconnect to a primary source and operate in island mode. (CMP-4)

Informational Note No. 1: See IEEE 1547, IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interface; IEEE 2030.7, IEEE Standard for the Specification of Microgrid Controllers; IEEE 2030.8, IEEE Standard for the Testing of Microgrid Controllers; and UL1008B, Outline for Source Interconnection, for additional information about microgrids.

Informational Note No. 2: Examples of power sources in microgrids include such items as photovoltaic systems, generators, fuel cell systems, wind electric systems, energy storage systems, electric vehicles that are used as a source of supply, and electrical power conversion from other energy sources.

**Microgrid, Health Care (Health Care Microgrid System). (Health Care Microgrid)**

A group of interconnected loads and distributed energy resources within clearly defined boundaries that acts as a single controllable entity with respect to the utility. [ 99: 3.3.75] (517) (CMP-15)

**Microgrid Control System (MCS).**

A structured control system that manages microgrid operations, functionalities for utility interoperability, islanded operations, and transitions. (CMP-4)

Informational Note: MCS differ from multiple standby generators or uninterruptible power supplies that are evaluated and rated to operate as a single source of backup power upon loss of the primary power source. MCS functions include coordination, transitions, and interoperability between multiple power sources.

**Microgrid Interconnect Device (MID).**

A device that enables a microgrid system to separate from and reconnect to an interconnected primary power source. (CMP-4)

**Mixer.**

Equipment used to combine and level match a multiplicity of electronic signals, such as from microphones, electronic instruments, and recorded audio. (640) (CMP-12)

**Mobile.**

X-ray equipment mounted on a permanent base with wheels and/or casters for moving while completely assembled. (660) (CMP-12)

**Mobile Home.**

A factory-assembled structure or structures transportable in one or more sections that are built on a permanent chassis and designed to be used as a dwelling without a permanent foundation where connected to the required utilities and that include the plumbing, heating, air-conditioning, and electrical systems contained therein. (CMP-7)

Informational Note: Unless otherwise indicated, the term *mobile home* includes manufactured home and excludes park trailers.

**Mobile Home Lot.**

A designated portion of a mobile home park designed for the accommodation of one mobile home and its accessory buildings or structures for the exclusive use of its occupants. (550) (CMP-7)

**Mobile Home Park.**

A contiguous parcel of land that is used for the accommodation of mobile homes that are intended to be occupied. (550) (CMP-7)

**Module, AC. (AC Module)**

A complete, environmentally protected unit consisting of solar cells, inverter, and other components, designed to produce ac power. (690) (CMP-4)

**Module System, AC. (AC Module System)**

An assembly of ac modules, wiring methods, materials, and subassemblies that are evaluated, identified, and defined as a system. (690) (CMP-4)

**Momentary Rating.**

A rating based on an operating interval that does not exceed 5 seconds. (660) (CMP-12)

**Momentary Rating (Maximum Power).**

A rating based on an operating interval that does not exceed 5 seconds. (517) (CMP-15)

**Monitor.**

An electrical or electronic means to observe, record, or detect the operation or condition of the electric power system or apparatus. (750) (CMP-13)

**Monopole Circuit.**

An electrical subset of a PV system that has two conductors in the output circuit, one positive (+) and one negative (-). (690) (CMP-4)

**Monorail.**

Overhead track and hoist system for moving material around the boatyard or moving and launching boats. [ **303:** 3.3.16] (555) (CMP-7)

**Mooring(s).**

Any place where a boat is wet stored or berthed. [ **303:** 3.3.17] (555) (CMP-7)

**Motion Picture Studio (Television Studio).**

A building, group of buildings, other structures, and outdoor areas designed, constructed, permanently altered, designated, or approved for the purpose of motion picture or television production. (530) (CMP-15)

**Motor Control Center.**

An assembly of one or more enclosed sections having a common power bus and principally containing motor control units. (CMP-11)

**Motor Fuel Dispensing Facility.**

That portion of a property where motor fuels are stored and dispensed from fixed equipment into the fuel tanks of motor vehicles or marine craft or into approved containers, including all equipment used in connection therewith. [ **30A:** 3.3.11] (CMP-14)

Informational Note: See 511.1 with respect to electrical wiring and equipment for other areas used as lubritoriums, service rooms, repair rooms, offices, salesrooms, compressor rooms, and similar locations.

**Multi-Circuit Cable Outlet Enclosure.**

An enclosure containing one or more multi-circuit plugs, receptacles, or both. (520) (CMP-15)

**Multioutlet Assembly.**

A surface, flush, or freestanding assemblage with a raceway and fittings or other enclosure provided with one or more receptacles, for the purpose of supplying power to utilization equipment. (CMP-18)

**Nacelle.**

An enclosure housing the alternator and other parts of a wind turbine. (694) (CMP-4)

**Neon Tubing.**

Electric-discharge luminous tubing, including cold cathode luminous tubing, that is manufactured into shapes to illuminate signs, form letters, parts of letters, skeleton tubing, outline lighting, other decorative elements, or art forms and filled with various inert gases. (600) (CMP-18)

**Network Interface Unit (NIU).**

A device that converts a broadband signal into component voice, audio, video, data, and interactive services signals and provides isolation between the network power and the premises signal circuits. These devices often contain primary and secondary protectors. (CMP-16)

**Network Terminal.**

A device that converts network-provided signals (optical, electrical, or wireless) into component signals, including voice, audio, video, data, wireless, optical, and interactive services, and is considered a network device on the premises that is connected to a communications service provider and is powered at the premises. (CMP-16)

**Neutral Conductor.**

The conductor connected to the neutral point of a system that is intended to carry current under normal conditions. (CMP-5)

**Neutral Point.**

The common point on a wye-connection in a polyphase system or midpoint on a single-phase, 3-wire system, or midpoint of a single-phase portion of a 3-phase delta system, or a midpoint of a 3-wire, direct-current system. (CMP-5)

Informational Note: At the neutral point of the system, the vectorial sum of the nominal voltages from all other phases within the system that utilize the neutral, with respect to the neutral point, is zero potential.

**Nonautomatic.**

Requiring human intervention to perform a function. (CMP-1)

**Nonincendive Circuit.**

A circuit, other than field wiring, in which any arc or thermal effect produced under intended operating conditions of the equipment, is not capable, under specified test conditions, of igniting the flammable gas–air, vapor–air, or dust–air mixture. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Nonincendive Component.**

A component having contacts for making or breaking an incendive circuit and the contacting mechanism is constructed so that the component is incapable of igniting the specified flammable gas–air or vapor–air mixture. The housing of such a component is not intended to exclude the flammable atmosphere or contain an explosion. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Nonincendive Equipment.**

Equipment having electrical/electronic circuitry that is incapable, under normal operating conditions, of causing ignition of a specified flammable gas–air, vapor–air, or dust–air mixture due to arcing or thermal means. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Nonincendive Field Wiring.**

Wiring that enters or leaves an equipment enclosure and, under normal operating conditions of the equipment, is not capable, due to arcing or thermal effects, of igniting the flammable gas–air, vapor–air, or dust–air mixture. Normal operation includes opening, shorting, or grounding the field wiring. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Nonincendive Field Wiring Apparatus.**

Apparatus intended to be connected to nonincendive field wiring. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Nonlinear Load.**

A load where the wave shape of the steady-state current does not follow the wave shape of the applied voltage. (CMP-1)

Informational Note: Electronic equipment, electronic/electric-discharge lighting, adjustable-speed drive systems, and similar equipment may be nonlinear loads.

**Nonmetallic Extension.**

An assembly of two insulated conductors within a nonmetallic jacket or an extruded thermoplastic covering. The classification includes surface extensions intended for mounting directly on the surface of walls or ceilings. (CMP-6)

**Nonsparking.**

Constructed to minimize the risk of arcs or sparks capable of creating an ignition hazard during conditions of normal operation. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Normal/Emergency Power Source.**

A power source on the output side of a transfer switch or uninterruptible power supply that is automatically available upon loss of normal power. (700) (CMP-13).

**Normal High-Water Level (as applies to electrical datum plane distances).**

Natural or Artificially Made Shorelines: An elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly the point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial.

Rivers and Streams: The elevation of the top of the bank of the channel. Streams, rivers, and tributaries that are prone to flooding and effects of water runoff shall consider the "bankfull stage" where an established gauge height at a given location along a river or stream, above which a rise in water surface will cause the river or stream to overflow the lowest natural stream bank somewhere in the corresponding reach.

Flood Control Bodies of Water: The flood pool maximum water surface elevation of a reservoir, equal to the elevation of the spillway.

Nonflood Control Bodies of Water: The flowage easement boundary in which the highest water surface elevation defined by the area existing between governmental-owned property line(s) and a contour line with perpetual rights to flood the area in connection with the operation of the reservoir.

(CMP-7)

**Nurses' Station.**

A space intended to provide a center of nursing activity for a group of nurses serving bed patients, where patient calls are received, nurses dispatched, nurses' notes written, inpatient charts prepared, and medications prepared for distribution to patients. Where such activities are carried on in more than one location within a nursing unit, all such separate spaces are considered a to be parts of the nurses' station. (517) (CMP-15)



**Nursing Home.**

A building or portion of a building used on a 24-hour basis for the housing and nursing care of four or more persons who, because of mental or physical incapacity, might be unable to provide for their own needs and safety without the assistance of another person.  
[ 101 : 3.3.150.2] (CMP-15)

**Office Furnishing.**

Cubicle panels, partitions, study carrels, workstations, desks, shelving systems, and storage units that may be mechanically and electrically interconnected to form an office furnishing system. (CMP-18)

**Oil Immersion.**

Electrical equipment immersed in a protective liquid so that an explosive atmosphere that might be above the liquid or outside the enclosure cannot be ignited. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Open Wiring on Insulators.**

An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings. (CMP-6)

**Operating Device.**

The car switch, pushbuttons, key or toggle switch(s), or other devices used to activate the operation controller. (620) (CMP-12)

**Operator.**

The individual responsible for starting, stopping, and controlling an amusement ride or supervising a concession. (525) (CMP-15)

**Optical Radiation.**

Electromagnetic radiation at wavelengths in vacuum between the region of transition to X-rays and the region of transition to radio waves that is approximately between 1 nm and 1000  $\mu\text{m}$ . (CMP-14)

Informational Note: See ANSI/UL 60079-28, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*, for information on types of protection that can be applied to minimize the risk of ignition in explosive atmospheres from optical radiation in the wavelength range from 380 nm to 10  $\mu\text{m}$ .

**Optical Radiation, Inherently Safe “op is”. (Inherently Safe Optical Radiation “op is”)**

Type of protection to minimize the risk of ignition in explosive atmospheres from optical radiation where visible or infrared radiation is incapable of producing sufficient energy under normal or specified fault conditions to ignite a specific explosive atmosphere. (CMP-14)

Informational Note: See ANSI/UL 60079-28, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*, for additional information.

**Optical Radiation, Protected “op pr”. (Protected Optical Radiation “op pr”)**

Type of protection to minimize the risk of ignition in explosive atmospheres from optical radiation where visible or infrared radiation is confined inside optical fiber or other transmission medium under normal constructions or constructions with additional mechanical protection based on the assumption that there is no escape of radiation from the confinement. (CMP-14)

Informational Note: See ANSI/UL 60079-28, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*, for additional information.

**Optical System With Interlock “op sh”.**

Type of protection to minimize the risk of ignition in explosive atmospheres from optical radiation where visible or infrared radiation is confined inside optical fiber or other transmission medium with interlock cutoff provided to reliably reduce the unconfined beam strength to safe levels within a specified time in case the confinement fails and the radiation becomes unconfined. (CMP-14)

Informational Note: See ANSI/UL 60079-28, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*, for additional information.

**Optional Standby Systems.**

Those systems intended to supply power to public or private facilities or property where life safety does not depend on the performance of the system. These systems are intended to supply on-site generated or stored power to selected loads either automatically or manually. (CMP-13)

**Organ, Electronic. (Electronic Organ)**

A musical instrument that imitates the sound of a pipe organ by producing sound electronically. (CMP-12)

Informational Note: Most new electronic organs produce sound digitally and are called digital organs.

**Organ, Pipe. (Pipe Organ)**

A musical instrument that produces sound by driving pressurized air (called *wind*) through pipes selected via a keyboard. (CMP-12)

**Organ, Pipe Sounding Apparatus. (Pipe Organ Sounding Apparatus) (Pipe Organ Chamber).**

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. (CMP-12)

**Outlet.**

A point on the wiring system at which current is taken to supply utilization equipment. (CMP-1)

**Outlet Box Hood.**

A housing shield intended to fit over a faceplate for flush-mounted wiring devices, or an integral component of an outlet box or of a faceplate for flush-mounted wiring devices. The hood does not serve to complete the electrical enclosure; it reduces the risk of water coming in contact with electrical components within the hood, such as attachment plugs, current taps, surge protective devices, direct plug-in transformer units, or wiring devices. (CMP-18)

**Outline Lighting.**

An arrangement of incandescent lamps, electric-discharge lighting, or other electrically powered light sources to outline or call attention to certain features such as the shape of a building or the decoration of a window. (CMP-18)

**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). (625) (CMP-12)

**Output Cable to the Primary Pad.**

A multiconductor, 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. (625) (CMP-12)

**Overcurrent.**

Any current in excess of the rated current of equipment or the ampacity of a conductor. It may result from overload, short circuit, or ground fault. (CMP-10)

Informational Note: A current in excess of rating may be accommodated by certain equipment and conductors for a given set of conditions. Therefore, the rules for overcurrent protection are specific for particular situations.

**Overcurrent Protective Device, Branch-Circuit. (Branch-Circuit Overcurrent Protective Device)**

A device capable of providing protection for service, feeder, and branch circuits and equipment over the full range of overcurrents between its rated current and its interrupting rating. (CMP-10)

**Overcurrent Protective Device, Current-Limiting. (Current-Limiting Overcurrent Protective Device)**

A device that, when interrupting currents in its current-limiting range, reduces the current flowing in the faulted circuit to a magnitude substantially less than that obtainable in the same circuit if the device were replaced with a solid conductor having comparable impedance. (240) (CMP-10)

**Overcurrent Protective Device, Supplementary. (Supplementary Overcurrent Protective Device)**

A device intended to provide limited overcurrent protection for specific applications and utilization equipment such as luminaires and appliances. This limited protection is in addition to the protection provided in the required branch circuit by the branch-circuit overcurrent protective device. (CMP-10)

**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. (626) (CMP-12)

**Overload.**

Operation of equipment in excess of normal, full-load rating, or of a conductor in excess of its ampacity that, when it persists for a sufficient length of time, would cause damage or dangerous overheating. A fault, such as a short circuit or ground fault, is not an overload. (CMP-10)

**Packaged Therapeutic Tub or Hydrotherapeutic Tank Equipment Assembly.**

A factory-fabricated unit consisting of water-circulating, heating, and control equipment mounted on a common base, intended to operate a therapeutic tub or hydrotherapeutic tank. Equipment can include pumps, air blowers, heaters, lights, controls, sanitizer generators, and so forth. (680) (CMP-17)

**Panelboard.**

A single panel or group of panel units designed for assembly in the form of a single panel, including buses and automatic overcurrent devices, and equipped with or without switches for the control of light, heat, or power circuits; designed to be placed in a cabinet, enclosure, or cutout box placed in or against a wall, partition, or other support; and accessible only from the front. (CMP-9)

**Panelboard, Enclosed. (Enclosed Panelboard)**

An assembly of buses and connections, overcurrent devices, and control apparatus with or without switches or other equipment, installed in a cabinet, cutout box, or enclosure suitable for a panelboard application. (CMP-9)

**Park Electrical Wiring Systems.**

All of the electrical wiring, luminaires, equipment, and appurtenances related to electrical installations within a mobile home park, including the mobile home service equipment. (550) (CMP-7)

**Park Trailer.**

A unit that is built on a single chassis mounted on wheels and has a gross trailer area not exceeding  $37\text{ m}^2$  ( $400\text{ ft}^2$ ) in the set-up mode. (552) (CMP-7)

**Part-Winding Motors.**

A part-winding start induction or synchronous motor is one that is arranged for starting by first energizing part of its primary (armature) winding and, subsequently, energizing the remainder of this winding in one or more steps. A standard part-winding start induction motor is arranged so that one-half of its primary winding can be energized initially, and, subsequently, the remaining half can be energized, both halves then carrying equal current. (CMP 11)

Informational Note: A hermetic refrigerant motor-compressor is not considered a standard part-winding start induction motor.

**Passenger Transportation Facilities.**

Any area open to the public associated with passenger transportation such as an airport, bus terminal, highway rest stop and service area, marina, seaport, ferry slip, subway station, train station, or port of entry. (CMP-18)

**Patient Bed Location.**

The location of a patient sleeping bed, or the bed or procedure table of a Category 1 space. [ 99: 3.3.138] (CMP-15)

**Patient Care-Related Electrical Equipment.**

Electrical equipment appliance that is intended to be used for diagnostic, therapeutic, or monitoring purposes in a patient care vicinity. [ 99: 3.3.139] (517) (CMP-15)

**Patient Care Space Category.**

Any space of a health care facility wherein patients are intended to be examined or treated. [ 99: 3.3.140] (517) (CMP-15)

Informational Note No. 1: The health care facility's governing body designates patient care space in accordance with the type of patient care anticipated.

Informational Note No. 2: Business offices, corridors, lounges, day rooms, dining rooms, or similar areas typically are not classified as patient care spaces. [ 99: A.3.3.140]

**Category 1 Space (Category 1).**

Space in which failure of equipment or a system is likely to cause major injury or death of patients, staff, or visitors. [ 99: 3.3.140.1] (CMP-15)

Informational Note: These spaces, formerly known as critical care rooms, are typically where patients are intended to be subjected to invasive procedures and connected to line-operated, patient care-related appliances. Examples include, but are not limited to, special care patient rooms used for critical care, intensive care, and special care treatment rooms such as angiography laboratories, cardiac catheterization laboratories, delivery rooms, operating rooms, post-anesthesia care units, trauma rooms, and other similar rooms. [ 99: A.3.3.140.1]

**Category 2 Space (Category 2).**

Space in which failure of equipment or a system is likely to cause minor injury to patients, staff, or visitors. [ 99: 3.3.140.2] (CMP-15)

Informational Note: These spaces were formerly known as general care rooms. Examples include, but are not limited to, inpatient bedrooms, dialysis rooms, in vitro fertilization rooms, procedural rooms, and similar rooms. [ 99: A.3.3.140.2]

**Category 3 Space (Category 3).**

Space in which the failure of equipment or a system is not likely to cause injury to patients, staff, or visitors but can cause discomfort. [ 99: 3.3.140.3] (517) (CMP-15)

Informational Note: These spaces, formerly known as basic care rooms, are typically where basic medical or dental care, treatment, or examinations are performed. Examples include, but are not limited to, examination or treatment rooms in clinics, medical and dental offices, nursing homes, and limited care facilities. [ 99: A.3.3.140.3]

**Category 4 Space (Category 4).**

Space in which failure of equipment or a system is not likely to have a physical impact on patient care. [ 99: 3.3.140.4] (517) (CMP-15)

Informational Note: These spaces were formerly known as support rooms. Examples of support spaces include, but are not limited to, anesthesia work rooms, sterile supply, laboratories, morgues, waiting rooms, utility rooms, and lounges. [ 99: A.3.3.140.4]

**Patient Care Vicinity.**

A space, within a location intended for the examination and treatment of patients, extending 1.8 m (6 ft) beyond the normal location of the bed, chair, table, treadmill, or other device that supports the patient during examination and treatment and extending vertically to 2.3 m (7 ft 6 in.) above the floor. [ 99: 3.3.141] (517) (CMP-15)

**Patient Equipment Grounding Point.**

A jack or terminal that serves as the collection point for redundant grounding of electric appliances serving a patient care vicinity or for grounding other items in order to eliminate electromagnetic interference problems. [ 99: 3.3.142] (517) (CMP-15)

**Performance Area.**

The stage and audience seating area associated with a temporary stage structure, whether indoors or outdoors, constructed of scaffolding, truss, platforms, or similar devices, that is used for the presentation of theatrical or musical productions or for public presentations. (520) (CMP-15)

**Permanent Amusement Attraction.**

A ride device, entertainment device, or a combination of both that is installed such that portability or relocation is impracticable. (522) (CMP-15)

**Permanently Installed Decorative Fountains and Reflection Pools.**

Those that are constructed in the ground, on the ground, or in a building in such a manner that the fountain cannot be readily disassembled for storage, whether or not served by electrical circuits of any nature. These units are primarily constructed for their aesthetic value and are not intended for swimming or wading. (680) (CMP-17)

**Personnel Protection System (as applied to EVSE).**

A system of personnel protection devices and constructional features that when used together provide protection against electric shock of personnel. (625) (CMP-12)

**Phase, Manufactured. (Manufactured Phase)**

The phase that originates at the phase converter and is not solidly connected to either of the single-phase input conductors. (CMP-13)

**Phase Converter.**

An electrical device that converts single-phase power to 3-phase electric power. (CMP-13)

Informational Note: Phase converters have characteristics that modify the starting torque and locked-rotor current of motors served, and consideration is required in selecting a phase converter for a specific load.

**Phase Converter, Rotary. (Rotary-Phase Converter)**

A device that consists of a rotary transformer and capacitor panel(s) that permits the operation of 3-phase loads from a single-phase supply. (455) (CMP-13)

**Phase Converter, Static. (Static-Phase Converter)**

A device without rotating parts, sized for a given 3-phase load to permit operation from a single-phase supply. (455) (CMP-13)

**Photovoltaic Cell (PV). (Solar Cell).**

The basic photovoltaic device that generates dc electricity when exposed to light. (CMP-4)

**Pier.**

A structure extending over the water and supported on a fixed foundation (fixed pier), or on flotation (floating pier), that provides access to the water. [ 303: 3.3.18] (CMP-7)

**Pier, Fixed. (Fixed Pier)**

Pier constructed on a permanent, fixed foundation, such as on piles, that permanently establishes the elevation of the structure deck with respect to land. [ 303: 3.3.18.2] (CMP-7)

**Pier, Floating. (Floating Pier)**

Pier designed with inherent flotation capability that allows the structure to float on the water surface and rise and fall with water level changes. [ 303: 3.3.18.3] (CMP-7)

**Pipeline.**

A length of pipe including pumps, valves, flanges, control devices, strainers, and/or similar equipment for conveying fluids. (CMP-17)

**Plenum.**

A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system. (CMP-3)

**Plenum Cable, Cable Routing Assemblies, and Raceways.**

Cables, cable routing assemblies, and raceways that have adequate fire-resistant and low smoke-producing characteristics and are suitable for use in ducts, plenums, and other spaces used for environmental air. (722) (CMP-3)

**Point of Entrance.**

The point within a building at which the wire or cable emerges from an external wall, from the roof, or from a concrete floor slab. (CMP-16)

**Pool.**

Manufactured or field-constructed equipment designed to contain water on a permanent or semipermanent basis and used by persons for swimming, wading, immersion, or therapeutic purposes, but not including bodies of water incorporated as part of an industrial process or lakes, lagoons, surf parks, or other natural and man-made bodies of water that may incorporate swimming and swimming areas. (680) (CMP-17)

Informational Note: Natural and man-made bodies of water, which includes lakes, lagoons, surf parks, or other similar bodies of water, are addressed in Article 682 .

**Pool, Immersion. (Immersion Pool)**

A pool for ceremonial or ritual immersion of users, which is designed and intended to have its contents drained or discharged. (680) (CMP-17)

**Pool, Permanently Installed Swimming, Wading, Immersion, and Therapeutic. (Permanently Installed Swimming, Wading, Immersion, and Therapeutic Pools)**

Those that are constructed or installed in the ground or partially in the ground, and all pools installed inside of a building, whether or not served by electrical circuits of any nature. (680) (CMP-17)



**Pool, Storable; used for Swimming, Wading, or Immersion (Storable Immersion Pool): (Storable Pool)**

Pools installed entirely on or above the ground that are intended to be stored when not in use and are designed for ease of relocation, regardless of water depth. (680) (CMP-17)

**Pool Cover, Electrically Operated. (Electrically Operated Pool Cover)**

Motor-driven equipment designed to cover and uncover the water surface of a pool by means of a flexible sheet or rigid frame. (680) (CMP-17)

**Pool Lift, Electrically Powered. (Electrically Powered Pool Lift)**

An electrically powered lift that provides accessibility for people with disabilities to and from a pool or spa. (680) (CMP-17)

**Portable.**

A device intended for indoor or outdoor use that is designed to be hand-carried from location to location, or easily transported without the use of other devices or equipment. (625) (CMP-12)

**Portable.**

X-ray equipment designed to be hand-carried. (660) (CMP-12)

**Portable (as applied to equipment).**

Equipment that is actually moved or can easily be moved from one place to another in normal use. (680) (CMP-17)

**Portable Power Distribution Unit.**

A power distribution box containing receptacles and overcurrent devices. (520) (CMP-15)

Informational Note: See ANSI/UL 1640, *Portable Power-Distribution Equipment*, for information on portable power distribution units.

**Portable Structures.**

Units designed to be moved including, but not limited to, amusement rides, attractions, concessions, tents, trailers, trucks, and similar units. (525) (CMP-15)

**Portable Substation.**

A portable assembly, usually mounted on a trailer, containing primary and secondary switchgear and a transformer. (530) (CMP-15)

**Powder Filling “q”.**

Type of protection where electrical parts capable of igniting an explosive atmosphere are fixed in position and completely surrounded by filling material (glass or quartz powder) to prevent the ignition of an external explosive atmosphere. (CMP-14)

Informational Note: See ANSI/UL 60079-5, *Explosive Atmospheres — Part 5: Equipment protection by powder filling “q”*, for additional information.

**Power Outlet.**

An enclosed assembly that may include receptacles, circuit breakers, fuseholders, fused switches, buses, and watt-hour meter mounting means; intended to supply and control power to mobile homes, recreational vehicles, park trailers, or boats or to serve as a means for distributing power required to operate mobile or temporarily installed equipment. (CMP-7)

**Power Outlet, Marina. (Marina Power Outlet)**

An enclosed assembly that can include equipment such as receptacles, circuit breakers, fused switches, fuses, watt-hour meters, panelboards, and monitoring means identified for marina use. (555) (CMP-7)

**Power Production Equipment.**

Electrical generating equipment supplied by any source other than a utility service, up to the source system disconnecting means. (CMP-4)

Informational Note: Examples of power production equipment include such items as generators, solar photovoltaic systems, and fuel cell systems.

**Power Source Output Conductors.**

The conductors between power production equipment and the service or other premises wiring. (CMP-4)

**Power Supply.**

A Class 2 power supply connected between the branch-circuit power distribution system and the busbar low-voltage suspended ceiling power distribution system. (393) (CMP-18)

**Power-Supply Cord.**

An assembly consisting of an attachment plug and a length of flexible cord connected to utilization equipment. (CMP-6)

**Premises.**

The land and buildings located on the user's side of the point of demarcation between the communications service provider and the user. (800) (CMP-16)

**Premises-Powered.**

Using power provided locally from the premises. (CMP-16)

**Premises Wiring (System).**

Interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all their associated hardware, fittings, and wiring devices, both permanently and temporarily installed. This includes one of the following:

- (1) Wiring from the service point or power source to the outlets
- (2) Wiring from and including the power source to the outlets where there is no service point

Such wiring does not include wiring internal to appliances, luminaires, motors, controllers, motor control centers, and similar equipment. (CMP-1)

Informational Note: Power sources include, but are not limited to, interconnected or stand-alone batteries, solar photovoltaic systems, other distributed generation systems, or generators.

**Pressurized.**

The process of supplying an enclosure with a protective gas with or without continuous flow at sufficient pressure to prevent the entrance of combustible dust or ignitable fibers/flyings. (CMP-14)

**Pressurized Enclosure "p".**

Type of protection for electrical equipment that uses the technique of guarding against the ingress of the external atmosphere, which might be explosive, into an enclosure by maintaining a protective gas therein at a pressure above that of the external atmosphere. (CMP-14)

Informational Note: See ANSI/UL-60079-2, *Explosive Atmospheres — Part 2: Equipment protection by pressurized enclosures "p"*, for additional information.

**Pressurized Room “p”.**

A room volume protected by pressurization and of sufficient size to permit the entry of a person who might occupy the room. (CMP-14)

Informational Note: See ANSI/UL 60079-13, *Explosive Atmospheres — Part 13: Equipment protection by pressurized room “p” and artificially ventilated room “v”*, for information on the requirements for rooms intended for human entry where pressurization is used as a means of reducing the risk of explosion.

**Primary Pad.**

A device external to the EV that transfers power via the contactless coupling as part of a wireless power transfer system. (625) (CMP-12)

**Primary Source.**

An electric utility or another source of power that acts as the main forming and stabilizing source in an electric power system. (CMP-4)

**Prime Mover.**

The machine that supplies the mechanical horsepower to a generator. (CMP-13)

**Process Seal.**

A seal between electrical systems and flammable or combustible process fluids where a failure could allow the migration of process fluids into the premises' wiring system. (CMP-14)

Informational Note: See ANSI/UL 122701, *Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids*, for additional information.

**Production Areas.**

Areas where portable electrical equipment is used to implement the capture of images. (530) (CMP-15)

**Projector, Nonprofessional. (Nonprofessional Projector)**

Those types of projectors that do not comply with the definition of *Professional-Type Projector*. (540) (CMP-15)

**Projector, Professional-Type. (Professional-Type Projector)**

A type of projector using 35- or 70-mm film that has a minimum width of 35 mm (1  $\frac{3}{8}$  in.) and has on each edge 212 perforations per meter (5.4 perforations per inch), or a type using carbon arc, xenon, or other light source equipment that develops hazardous gases, dust, or radiation. (540) (CMP-15)

**Proscenium.**

The wall and arch that separates the stage from the auditorium (i.e., house). (520) (CMP-15)

**Protection by Enclosure “t”.**

Type of protection for explosive dust atmospheres where electrical equipment is provided with an enclosure providing dust ingress protection and a means to limit surface temperatures. (CMP-14)

Informational Note: See ANSI/UL 60079-31, *Explosive Atmospheres — Part 31: Equipment Dust Ignition Protection by Enclosure “t”*, for additional information.

**Psychiatric Hospital.**

A building used exclusively for the psychiatric care, on a 24-hour basis, of four or more inpatients. (517) (CMP-15)

**Purged and Pressurized.**

The process of (1) purging, supplying an enclosure with a protective gas at a sufficient flow and positive pressure to reduce the concentration of any flammable gas or vapor initially present to an acceptable level; and (2) pressurization, supplying an enclosure with a protective gas with or without continuous flow at sufficient pressure to prevent the entrance of a flammable gas or vapor, a combustible dust, or an ignitable fiber. (CMP-14)

Informational Note: See NFPA 496, *Standard for Purged and Pressurized Enclosures for Electrical Equipment*, for additional information.

**Purpose-Built.**

A custom luminaire, a piece of lighting equipment, or an effect that is constructed for a specific purpose and is not serially manufactured or available for general sale. (530) (CMP-15)

**PV DC Circuit (PV System DC Circuit).**

Any dc conductor in PV source circuits, PV string circuits, and PV dc-to-dc converter circuits. (690) (CMP-4)

**PV DC Circuit, Source. (PV Source Circuit)**

The PV dc circuit conductors between modules in a PV string circuit, and from PV string circuits or dc combiners, to dc combiners, electronic power converters, or a dc PV system disconnecting means. (690) (CMP-4)

**PV DC Circuit, String. (PV String Circuit)**

The PV source circuit conductors of one or more series-connected PV modules. (690) (CMP-4)

**PV Module (Module).**

A complete, environmentally protected unit consisting of solar cells and other components designed to produce dc power. (CMP-4)

**PV (Photovoltaic) System (PV System) (Photovoltaic System).**

The total components, circuits, and equipment up to and including the PV system disconnecting means that, in combination, convert solar energy into electric energy. (CMP-4)

**Qualified Person.**

One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved. (CMP-1)

Informational Note: See NFPA 70E-2021, *Standard for Electrical Safety in the Workplace*, for electrical safety training requirements.

**Raceway.**

An enclosed channel designed expressly for holding wires, cables, or busbars, with additional functions as permitted in this Code. (CMP-8)

**Raceway Cell.**

A single enclosed tubular space in a cellular metal or concrete floor member, the axis of the cell being parallel to the axis of the floor member. (CMP-8)

**Raceway, Cellular Metal Floor. (Cellular Metal Floor Raceway)**

The hollow spaces of cellular metal floors, together with suitable fittings, that may be approved as enclosed channel for electrical conductors. (CMP-8)

**Raceway, Communications. (Communications Raceway)**

An enclosed channel of nonmetallic materials designed expressly for holding communications wires and cables; optical fiber cables; data cables associated with information technology and communications equipment; Class 2, Class 3, and Type PLTC cables; and power-limited fire alarm cables in plenum, riser, and general-purpose applications. (CMP-16)

**Raceway, Strut-Type Channel. (Strut-Type Channel Raceway)**

A metal raceway that is intended to be mounted to the surface of or suspended from a structure, with associated accessories for the installation of electrical conductors and cables. (CMP-8)

**Raceway, Surface Metal. (Surface Metal Raceway)**

A metal raceway that is intended to be mounted to the surface of a structure, with associated couplings, connectors, boxes, and fittings for the installation of electrical conductors. (CMP-8)

**Raceway, Surface Nonmetallic. (Surface Nonmetallic Raceway)**

A nonmetallic raceway that is intended to be mounted to the surface of a structure, with associated couplings, connectors, boxes, and fittings for the installation of electrical conductors. (CMP-8)

**Raceway, Underfloor. (Underfloor Raceway)**

A raceway and associated components designed and intended for installation beneath or flush with the surface of a floor for the installation of cables and electrical conductors. (CMP-8)

**Rail.**

The structural support for the suspended ceiling system typically forming the ceiling grid supporting the ceiling tile and listed utilization equipment, such as sensors, actuators, A/V devices, and low-voltage luminaires and similar electrical equipment. (393) (CMP-18)

**Rainproof.**

Constructed, protected, or treated so as to prevent rain from interfering with the successful operation of the apparatus under specified test conditions. (CMP-1)

**Raintight.**

Constructed or protected so that exposure to a beating rain will not result in the entrance of water under specified test conditions. (CMP-1)

**Rated-Load Current (RLC).**

The current of a hermetic refrigerant motor-compressor resulting when it is operated at the rated load, rated voltage, and rated frequency of the equipment it serves. (440) (CMP-11)

**Rated Output Power.**

The amplifier manufacturer's stated or marked output power capability into its rated load. (640) (CMP-12)

**Rated Power.**

The output power of a wind turbine at its rated wind speed. (694) (CMP-4)

Informational Note: See IEC 61400-12-1, *Power Performance Measurements of Electricity Producing Wind Turbines*, for the method for measuring wind turbine power output.

**Receptacle.**

A contact device installed at the outlet for the connection of an attachment plug, or for the direct connection of electrical utilization equipment designed to mate with the corresponding contact device. A single receptacle is a single contact device with no other contact device on the same yoke or strap. A multiple receptacle is two or more contact devices on the same yoke or strap. (CMP-18)

Informational Note: A duplex receptacle is an example of a multiple receptacle that has two receptacles on the same yoke or strap.

**Receptacle, Weight-Supporting Ceiling (WSCR), (Weight-Supporting Ceiling Receptacle)**

A contact device installed at an outlet box for the connection and support of luminaries or ceiling-suspended (paddle) fans using a weight-supporting attachment fitting (WSAF). (CMP-18)

Informational Note: See ANSI/NEMA WD 6, *American National Standard for Wiring Devices — Dimensional Specifications*, for the standard configuration of weight-supporting ceiling receptacles and related weight-supporting attachment fittings.

**Receptacle Outlet.**

An outlet where one or more receptacles are installed. (CMP-18)

**Reconditioned.**

Electromechanical systems, equipment, apparatus, or components that are restored to operating conditions. This process differs from normal servicing of equipment that remains within a facility, or replacement of listed equipment on a one-to-one basis. (CMP-1)

Informational Note: The term *reconditioned* is frequently referred to as *rebuilt*, *refurbished*, or *remanufactured*.

**Recreational Vehicle (RV) (Camping Trailer) (Motor Home) (Travel Trailer) (Truck Camper).**

A vehicle or slide-in camper that is primarily designed as temporary living quarters for recreational, camping, or seasonal use; has its own motive power or is mounted on or towed by another vehicle; is regulated by the National Highway Traffic Safety Administration as a vehicle or vehicle equipment; does not require a special highway use permit for operation on the highways; and can be easily transported and set up on a daily basis by an individual. [ 1192: 3.3.52] (551) (CMP-7)

Informational Note: See NFPA 1192, *Standard on Recreational Vehicles*, Informative Annex A, for product types and definitions for motor homes and towable recreational vehicles.

**Recreational Vehicle Park.**

Any parcel or tract of land under the control of any person, organization, or governmental entity wherein two or more recreational vehicle, recreational park trailer, and/or other camping sites are offered for use by the public or members of an organization for overnight stays. (551) (CMP-7)

**Recreational Vehicle Site.**

A specific area within a recreational vehicle park or campground that is set aside for use by a camping unit. (551) (CMP-7)

**Recreational Vehicle Site Supply Equipment.**

A power outlet assembly located near the point of entrance of supply conductors to a recreational vehicle site and intended to constitute the disconnecting means for connected recreational vehicles. (551) (CMP-7)

**Recreational Vehicle Stand.**

That area of a recreational vehicle site intended for the placement of a recreational vehicle. (551) (CMP-7)

**Reference Grounding Point.**

The ground bus of the panelboard or isolated power system panel supplying the patient care room. [ 99: 3.3.158] (517) (CMP-15)

**Relative Analgesia.**

A state of sedation and partial block of pain perception produced in a patient by the inhalation of concentrations of nitrous oxide insufficient to produce loss of consciousness (conscious sedation). (517) (CMP-15)



**Relay, Automatic Load Control. (Automatic Load Control Relay)**

An emergency lighting control device used to set normally dimmed or normally-off switched emergency lighting equipment to full power illumination levels in the event of a loss of the normal supply by bypassing the dimming/switching controls, and to return the emergency lighting equipment to normal status when the device senses the normal supply has been restored. (700) (CMP-13)

Informational Note: See ANSI/UL 924, *Emergency Lighting and Power Equipment*, for the requirements covering automatic load control relays.

**Remote-Control Circuit.**

Any electrical circuit that controls any other circuit through a relay or an equivalent device. (CMP-3)

**Remote Disconnect Control.**

An electric device and circuit that controls a disconnecting means through a relay or equivalent device. (645) (CMP-12)

**Residual Current Device (RCD)**

A device that disconnects a circuit whenever the supply current is not equal to the return current within predetermined limits.

**Resistance Heating Element.**

A specific separate element to generate heat that is stand-alone, externally attached to, embedded in, integrated with, or internal to the object to be heated. (CMP-17)

Informational Note: Tubular heaters, strip heaters, heating cable, heating tape, heating blankets, immersion heaters, and heating panels are examples of resistance heaters.

**Restricted Industrial Establishment [as applied to hazardous (classified) locations].**

Establishment with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation. (CMP-14)

**Retrofit Kit.**

A complete subassembly of parts and devices for field conversion of utilization equipment. (CMP-18)

**Retrofit Kit, General Use. (General Use Retrofit Kit)**

A kit consisting of primary parts, which does not include all the parts for a complete subassembly but includes a list of required parts and installation instructions to complete the subassembly in the field. (600) (CMP-18)

**Retrofit Kit, Sign Specific. (Sign Specific Retrofit Kit)**

A kit consisting of the necessary parts and hardware to allow for field installation in a host sign, based on the included installation instructions. (600) (CMP-18)

**Reverse Polarity Protection (Backfeed Protection).**

A system that prevents two interconnected power supplies, connected positive to negative, from passing current from one power source into a second power source. (393) (CMP-18)

**Ride Device.**

A device or combination of devices that carry, convey, or direct a person(s) over or through a fixed or restricted course within a defined area for the primary purpose of amusement or entertainment. (522) (CMP-15)

**Riser Cable, Cable Routing Assemblies, and Raceways.**

Cables, cable routing assemblies, and raceways that have fire-resistant characteristics capable of preventing the carrying of fire from floor to floor and are suitable for use in a vertical run in a shaft or from floor to floor. (722) (CMP-3)

**Safe Zone.**

Low probability of damage other than a slight swelling of the capacitor case, as identified by the case rupture curve of the capacitor. (460) (CMP-11)

**Safety Circuit.**

The part of a control system containing one or more devices that perform a safety-related function. [ 79: 3.3.95] (CMP-12)

Informational Note: See NFPA 79-2021, *Electrical Standard for Industrial Machinery*. *Safety-related control system* and *safety interlock circuit* are common terms that can be used to refer to the safety circuit in other standards. The safety circuit can include hard-wired, communication, and software-related components.

**Sealable Equipment.**

Equipment enclosed in a case or cabinet that is provided with a means of sealing or locking so that live parts cannot be made accessible without opening the enclosure. (CMP-1)

Informational Note: The equipment may or may not be operable without opening the enclosure.

**Sealed [as applied to hazardous (classified) locations].**

Constructed such that equipment is sealed effectively against entry of an external atmosphere and is not opened during normal operation or for any maintenance activities. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Sealed, Hermetically. (Hermetically Sealed)**

Sealed against the entrance of an external atmosphere, such that the seal is made by fusion of metal to metal, ceramic to metal, or glass to metal. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

**Section Sign.**

A sign or outline lighting system, shipped as subassemblies, that requires field-installed wiring between the subassemblies to complete the overall sign. The subassemblies are either physically joined to form a single sign unit or are installed as separate remote parts of an overall sign. (600) (CMP-18)

**Selected Receptacles.**

A minimal number of receptacles selected by the health care facility's governing body as necessary to provide essential patient care and facility services during loss of normal power. [ 99: 3.3.164] (517) (CMP-15)

**Self-Contained Therapeutic Tubs or Hydrotherapeutic Tanks.**

A factory-fabricated unit consisting of a therapeutic tub or hydrotherapeutic tank with all water-circulating, heating, and control equipment integral to the unit. Equipment may include pumps, air blowers, heaters, light controls, sanitizer generators, and so forth. (680) (CMP-17)

**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 transport refrigerated unit (TRU) flanged surface inlet. (626) (CMP-12)

**Separately Derived System.**

An electrical power supply output, other than a service, having no direct connection(s) to circuit conductors of any other electrical source other than those established by grounding and bonding connections. (CMP-5)

**Service.**

The conductors and equipment connecting the serving utility to the wiring system of the premises served. (CMP-10)

**Service Conductors.**

The conductors from the service point to the service disconnecting means. (CMP-10)

**Service Conductors, Overhead. (Overhead Service Conductors)**

The overhead conductors between the service point and the first point of connection to the service-entrance conductors at the building or other structure. (CMP-10)

**Service Conductors, Underground. (Underground Service Conductors)**

The underground conductors between the service point and the first point of connection to the service-entrance conductors in a terminal box, meter, or other enclosure, inside or outside the building wall. (CMP-10)

Informational Note: Where there is no terminal box, meter, or other enclosure, the point of connection is considered to be the point of entrance of the service conductors into the building.

**Service Drop.**

The overhead conductors between the serving utility and the service point. (CMP-10)

**Service-Entrance Conductor Assembly.**

Multiple single-insulated conductors twisted together without an overall covering, other than an optional binder intended only to keep the conductors together. (CMP-6)

**Service-Entrance Conductors.**

The service conductors between the terminals of the service equipment to the service drop, overhead service conductors, service lateral, or underground service conductors. (CMP-10)

Informational Note: Where service equipment is located outside the building walls, there could be no service-entrance conductors or they might be entirely outside the building.

**Service Equipment.**

The necessary equipment, consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the serving utility and intended to constitute the main control and disconnect of the serving utility. (CMP-10)

**Service Equipment, Mobile Home. (Mobile Home Service Equipment)**

The equipment containing the disconnecting means, overcurrent protective devices, and receptacles or other means for connecting a mobile home feeder assembly. (550). (CMP-7)

**Service Lateral.**

The underground conductors between the utility electric supply system and the service point. (CMP-10)

**Service Point.**

The point of connection between the facilities of the serving utility and the premises wiring. (CMP-10)

Informational Note: The service point can be described as the point of demarcation between where the serving utility ends and the premises wiring begins. The serving utility generally specifies the location of the service point based on the conditions of service.

**Servicing.**

The process of following a manufacturer's set of instructions or applicable industry standards to analyze, adjust, or perform prescribed actions upon equipment with the intention to preserve or restore the operational performance of the equipment. (CMP-1)

Informational Note: Servicing often encompasses maintenance and repair activities.

**Shore Power.**

The electrical equipment required to power a floating vessel including, but not limited to, the receptacle and cords. (555) (CMP-7)

**Shoreline.**

The farthest extent of standing water under the applicable conditions that determine the electrical datum plane for the specified body of water. (682) (CMP-17)

**Short Circuit.**

An abnormal connection (including an arc) of relatively low impedance, whether made accidentally or intentionally, between two or more points of different potential. (CMP-10)

**Short-Circuit Current Rating.**

The prospective symmetrical fault current at a nominal voltage to which an apparatus or system is able to be connected without sustaining damage exceeding defined acceptance criteria. (CMP-10)

**Show Window.**

Any window, including windows above doors, used or designed to be used for the display of goods or advertising material, whether it is fully or partly enclosed or entirely open at the rear and whether or not it has a platform raised higher than the street floor level. (CMP-2)

**Sign, Photovoltaic (PV) Powered (PV Powered Sign). [Photovoltaic (PV) Powered Sign]**

A complete sign powered by solar energy consisting of all components and subassemblies for installation either as an off-grid stand-alone, on-grid interactive, or non-grid interactive system. (600) (CMP-18)

**Sign Body.**

A portion of a sign that may provide protection from the weather but is not an electrical enclosure. (600) (CMP-18)

**Signaling Circuit.**

Any electrical circuit that energizes signaling equipment. (CMP-3)

**Simple Apparatus.**

An electrical component or combination of components of simple construction with well-defined electrical parameters that does not generate more than 1.5 volts, 100 mA, and 25 mW, or a passive component that does not dissipate more than 1.3 watts and is compatible with the intrinsic safety of the circuit in which it is used. (CMP-14)

Informational Note No. 1: The following are examples of simple apparatus:

- (1) Passive components; for example, switches, instrument connectors, plugs and sockets, junction boxes, resistance temperature devices, and simple semiconductor devices such as LEDs
- (2) Sources of stored energy consisting of single components in simple circuits with well-defined parameters; for example, capacitors or inductors, whose values are considered when determining the overall safety of the system
- (3) Sources of generated energy; for example, thermocouples and photocells, that do not generate more than 1.5 volts, 100 mA, and 25 mW

Informational Note No. 2: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*, and ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”*, for additional information.

**Single-Pole Separable Connector.**

A device that is installed at the ends of portable, flexible, single-conductor cable that is used to establish connection or disconnection between two cables or one cable and a single-pole, panel-mounted separable connector. (CMP-18)

**Site-Isolating Device.**

A pole-mounted disconnecting means installed at the distribution point for the purposes of isolation, system maintenance, emergency disconnection, or connection of optional standby systems. (547) (CMP-7)

**Skeleton Tubing.**

Neon tubing that is itself the sign or outline lighting and is not attached to an enclosure or sign body. (600) (CMP-18)

**Slip.**

A berthing space between or adjacent to piers, wharves, or docks; the water areas associated with boat occupation. [ 303: 3.3.21] (555) (CMP-7)

Informational Note: See the definition of *Berth* for additional information.

**Solid-State Phase-Control Dimmer.**

A solid-state dimmer where the wave shape of the steady-state current does not follow the wave shape of the applied voltage such that the wave shape is nonlinear. (CMP-15)

**Solid-State Sine Wave Dimmer.**

A solid-state dimmer where the wave shape of the steady-state current follows the wave shape of the applied voltage such that the wave shape is linear. (CMP-15)

**Spa or Hot Tub.**

A hydromassage pool, or tub for recreational or therapeutic use, not located in health care facilities, designed for immersion of users, and usually having a filter, heater, and motor-driven blower. It may be installed indoors or outdoors, on the ground or supporting structure, or in the ground or supporting structure. Generally, they are not designed or intended to have its contents drained or discharged after each use. (680) (CMP-17)

**Spa or Hot Tub, Packaged Equipment Assembly. (Packaged Spa or Hot Tub Equipment Assembly)**

A factory-fabricated unit consisting of water-circulating, heating, and control equipment mounted on a common base, intended to operate a spa or hot tub. Equipment can include pumps, air blowers, heaters, lights, controls, sanitizer generators, and so forth. (680) (CMP-17)

**Spa or Hot Tub, Self-Contained. (Self-Contained Spa or Hot Tub)**

Factory-fabricated unit consisting of a spa or hot tub vessel with all water-circulating, heating, and control equipment integral to the unit. Equipment can include pumps, air blowers, heaters, lights, controls, sanitizer generators, and so forth. (680) (CMP-17)

**Spa or Hot Tub, Storable. (Storable Spa or Hot Tub)**

Spas or hot tubs installed entirely on or above the ground that are intended to be stored when not in use and are designed for ease of relocation. (680) (CMP-17)

**Space.**

A portion of the health care facility designated by the health care facility's governing body that serves a specific purpose. [ 99: 3.3.171] (517) (CMP-15)

**Special Permission.**

The written consent of the authority having jurisdiction. (CMP-1)

**Special Protection “s”.**

Type of protection that permits design, assessment, and testing of equipment that cannot be fully assessed within a recognized type of protection or combination of recognized types of protection because of functional or operational limitations, but that can be demonstrated to provide the necessary equipment protection level (EPL). (CMP-14)

Informational Note: See ANSI/UL 60079-33, *Explosive Atmospheres — Part 33: Equipment Protection by Special Protection “s”*, for additional information.

**Special-Purpose Multi-Circuit Cable System.**

A portable branch-circuit distribution system consisting of one or more trunk cables and optional breakout assemblies or multi-circuit outlet enclosures. (520) (CMP-15)

**Spider (Cable Splicing Block).**

A device that contains busbars that are insulated from each other for the purpose of splicing or distributing power to portable cables and cords that are terminated with single-pole busbar connectors. (530) (CMP-15)

**Spin Down.**

A shutdown condition of the FESS, where energy is being dissipated and the flywheel rotor is slowing down to a stop. (706) (CMP-13)

Informational Note: A complete stop of a flywheel rotor cannot occur instantaneously because of the high kinetic energy of the rotor, but rather occurs over time as a result of friction forces acting on the rotor.

**Splash Pad.**

A fountain intended for recreational use by pedestrians and designed to contain no more than 25 mm (1 in.) of water depth. This definition does not include showers intended for hygienic rinsing prior to use of a pool, spa, or other water feature. (680) (CMP-17)



### **Spray Area.**

Any fully enclosed, partly enclosed, or unenclosed area in which flammable or combustible vapors, mists, residues, dusts, or deposits are present due to the operation of spray processes, including:

- (1) any area in the direct path of a spray application process;
- (2) the interior of a spray booth, spray room, or limited finishing workstation, as herein defined;
- (3) the interior of any exhaust plenum, eliminator section, or scrubber section;
- (4) the interior of any exhaust duct or exhaust stack leading from a spray application process;
- (5) the interior of any air recirculation path up to and including recirculation particulate filters;
- (6) any solvent concentrator (pollution abatement) unit or solvent recovery (distillation) unit; and
- (7) the inside of a membrane enclosure.

The following are not part of the spray area:

- (1) fresh air make-up units;
- (2) air supply ducts and air supply plenums;
- (3) recirculation air supply ducts downstream of recirculation particulate filters; and
- (4) exhaust ducts from solvent concentrator (pollution abatement) units. [ 33: 3.3.2.3] (CMP-14)

Informational Note No. 1: Unenclosed spray areas are locations outside of buildings or are localized operations within a larger room or space. Such areas are normally provided with some local vapor extraction/ventilation system. In automated operations, the area limits are the maximum area in the direct path of spray operations. In manual operations, the area limits are the maximum area of spray when aimed at 90 degrees to the application surface.

Informational Note No. 2: See definitions for *limited finishing workstation* and *membrane enclosure* for additional information.

### **Spray Area, Outdoor. (Outdoor Spray Area)**

A spray area that is outside the confines of a building or that has a canopy or roof that does not limit the dissipation of the heat of a fire or dispersion of flammable vapors and does not restrict fire-fighting access and control. For the purpose of this standard, an outdoor spray area can be treated as an unenclosed spray area as defined in this Code . [ 33: 3.3.2.3.1] (CMP-14)

### **Spray Area, Unenclosed. (Unenclosed Spray Area)**

Any spray area that is not confined by a limited finishing workstation, spray booth, or spray room, as herein defined. [ 33: 3.3.2.3.2] (CMP-14)

### **Spray Booth.**

A power-ventilated enclosure for a spray application operation or process that confines and limits the escape of the material being sprayed, including vapors, mists, dusts, and residues that are produced by the spraying operation and conducts or directs these materials to an exhaust system. [ 33: 3.3.19] (CMP-14)

Informational Note: A spray booth is an enclosure or insert within a larger room used for spraying, coating, and/or dipping applications. A spray booth can be fully enclosed or have open front or face and can include a separate conveyor entrance and exit. The spray booth is provided with a dedicated ventilation exhaust with supply air from the larger room or from a dedicated air supply.

**Spray Room.**

A power-ventilated fully enclosed room with a specified fire resistance rating used exclusively for open spraying of flammable or combustible materials. [ **33:** 3.3.20] (CMP-14)

**Stage Effect (Special Effect).**

An electrical or electromechanical piece of equipment used to simulate a distinctive visual or audible effect, such as a wind machine, lightning simulator, or sunset projector. (CMP-15)

**Stage Equipment.**

Equipment at any location on the premises integral to the stage production including, but not limited to, equipment for lighting, audio, special effects, rigging, motion control, projection, or video. (520) (CMP-15)

**Stage Lighting Hoist.**

A motorized lifting device that contains a mounting position for one or more luminaires, with wiring devices for connection of luminaires to branch circuits, and integral flexible cables to allow the luminaires to travel over the lifting range of the hoist while energized. (520) (CMP-15)

**Stage Property.**

An article or object used as a visual element in a motion picture or television production, except painted backgrounds (scenery) and costumes. (530) (CMP-15)

**Stage Set.**

A specific area set up with temporary scenery and properties designed and arranged for a particular scene in a motion picture or television production. (CMP-15)

**Stage Switchboard, Fixed. (Fixed Stage Switchboard)**

A permanently installed switchboard, panelboard, or rack containing dimmers or relays with associated overcurrent protective devices, or overcurrent protective devices alone, used primarily to feed stage equipment. (CMP-15)

**Stage Switchboard, Portable. (Portable Stage Switchboard)**

A portable rack or pack containing dimmers or relays with associated overcurrent protective devices, or overcurrent protective devices alone, used to feed stage equipment. (520) (CMP-15)

**Stand Lamp.**

A portable stand that contains a general-purpose luminaire or lampholder with guard for the purpose of providing general illumination on a stage, in an auditorium, or in a studio. (520) (CMP-15)

**Stand-Alone System.**

A system that is not connected to an electric power production and distribution network. (CMP-4)

**Stationary (as applied to equipment).**

Equipment that is not moved from one place to another in normal use. (680) (CMP-17)

**Storage, Dry Stack. (Dry Stack Storage)**

A facility, either covered or uncovered, constructed of horizontal and vertical structural members designed to allow placement of small boats in defined slots arranged both horizontally and vertically. [ **303:** 3.3.24.2] (555) (CMP-7)

**Stored-Energy Power Supply System (SEPSS).**

A complete functioning EPSS powered by a stored-energy electrical source. (CMP-13)

**Stranding, Compact. (Compact Stranding)**

A conductor stranding method in which each layer of strands is pressed together to minimize the gaps between the strands so the overall diameter of the finished conductor is less than a concentric stranded conductor and less than a compressed stranded conductor. (CMP-6)

**Stranding, Compressed. (Compressed Stranding)**

A conductor stranding method in which the outer layer of strands is pressed together so the overall diameter of the finished conductor is less than a concentric stranded conductor but greater than a compact stranded conductor. (CMP-6)

**Stranding, Concentric. (Concentric Stranding)**

A conductor consisting of a straight central strand surrounded by one or more layers of strands, helically laid in a geometric pattern. (CMP-6)

**Strip Light.**

A luminaire with multiple lamps arranged in a row. (520) (CMP-15)

**Structure.**

That which is built or constructed, other than equipment. (CMP-1)

**Structure, Relocatable. (Relocatable Structure)**

A factory-assembled structure or structures transportable in one or more sections that are built on a permanent chassis and designed to be used as other than a dwelling unit without a permanent foundation. (545) (CMP-7)

Informational Note: Examples of relocatable structures are those units that are equipped for sleeping purposes only, contractor's and other on-site offices, construction job dormitories, studio dressing rooms, banks, clinics, stores, shower facilities and restrooms, training centers, or for the display or demonstration of merchandise or machines.

**Subassembly.**

Component parts or a segment of a sign, retrofit kit, or outline lighting system that, when assembled, forms a complete unit or product. (600) (CMP-18)

**Substation.**

An assemblage of equipment (e.g., switches, interrupting devices, circuit breakers, buses, and transformers) through which electric energy is passed for the purpose of distribution, switching, or modifying its characteristics. (CMP-9)

**Supervisory Control and Data Acquisition (SCADA).**

An electronic system that provides monitoring and controls for the operation of the critical operations power system. (CMP-13)

Informational Note: This can include the fire alarm system, security system, control of the HVAC, the start/stop/monitoring of the power supplies and electrical distribution system, annunciation and communications equipment to emergency personnel, facility occupants, and remote operators.

**Support Areas.**

Areas, other than fixed production offices, intended to support production and where image capture will not take place. Such areas include, but are not limited to, mobile production offices, storage, and workspaces; vehicles and trailers for cast, makeup, hair, lighting, grip, wardrobe, props, catering, and craft services; and portable restrooms. (530) (CMP-15)

**Surge Arrester.**

A protective device for limiting surge voltages by discharging or bypassing surge current; it also prevents continued flow of follow current while remaining capable of repeating these functions. (CMP-10)

**Surge-Protective Device (SPD).**

A protective device for limiting transient voltages by diverting or limiting surge current; it also prevents continued flow of follow current while remaining capable of repeating these functions and is designated as follows:

- (1) Type 1: Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service disconnect overcurrent device
- (2) Type 2: Permanently connected SPDs intended for installation on the load side of the service disconnect overcurrent device, including SPDs located at the branch panel
- (3) Type 3: Point of utilization SPDs
- (4) Type 4: Component SPDs, including discrete components, as well as assemblies. (CMP-10)

Informational Note: See UL 1449, *Standard for Surge Protective Devices*, for further information on SPDs.

**Suspended Ceiling Grid.**

A system that serves as a support for a finished ceiling surface and other utilization equipment. (393) (CMP-18)

**Switch, General-Use. (General-Use Switch)**

A switch intended for use in general distribution and branch circuits. It is rated in amperes, and it is capable of interrupting its rated current at its rated voltage. (CMP-9)

**Switch, General-Use Snap. (General-Use Snap Switch)**

A form of general-use switch constructed so that it can be installed in device boxes or on box covers, or otherwise used in conjunction with wiring systems recognized by this Code. (CMP-9)

**Switch, Isolating. (Isolating Switch)**

A switch intended for isolating an electrical circuit from the source of power. It has no interrupting rating, and it is intended to be operated only after the circuit has been opened by some other means. (CMP-9)

**Switch, Motor-Circuit. (Motor-Circuit Switch)**

A switch rated in horsepower that is capable of interrupting the maximum operating overload current of a motor of the same horsepower rating as the switch at the rated voltage. (CMP-11)

**Switchboard.**

A large single panel, frame, or assembly of panels on which are mounted on the face, back, or both, switches, overcurrent and other protective devices, buses, and usually instruments. (CMP-9)

Informational Note: These assemblies can be accessible from the rear or side as well as from the front and are not intended to be installed in cabinets.

**Switchgear.**

An assembly completely enclosed on all sides and top with sheet metal (except for ventilating openings and inspection windows) and containing primary power circuit switching, interrupting devices, or both, with buses and connections. The assembly may include control and auxiliary devices. Access to the interior of the enclosure is provided by doors, removable covers, or both. (CMP-9)

Informational Note: All switchgear subject to NEC requirements is metal enclosed. Switchgear rated below 1000 V or less may be identified as "low-voltage power circuit breaker switchgear." Switchgear rated over 1000 V may be identified as "metal-enclosed switchgear" or "metal-clad switchgear." Switchgear is available in non-arc-resistant or arc-resistant constructions.

**Switching Device(as applied to equipment rated over 1000 volts ac, 1500 volts dc, nominal).**

A device designed to close, open, or both, one or more electrical circuits. (CMP-9)

**Cutout.**

An assembly of a fuse support with either a fuseholder, fuse carrier, or disconnecting blade. The fuseholder or fuse carrier may include a conducting element (fuse link) or may act as the disconnecting blade by the inclusion of a nonfusible member.

**Disconnecting Switch (or Isolating Switch).**

A mechanical switching device used for isolating a circuit or equipment from a source of power.

**Interrupter Switch.**

A switching device capable of making, carrying, and interrupting specified currents.

**Oil-Filled Cutout.**

A cutout in which all or part of the fuse support and its fuse link or disconnecting blade is mounted in oil with complete immersion of the contacts and the fusible portion of the conducting element (fuse link) so that arc interruption by severing of the fuse link or by opening of the contacts will occur under oil.

**Oil Switch.**

A switching device having contacts that operate under oil (or askarel or other suitable liquid).

**Regulator Bypass Switch.**

A switching device or combination of switching devices designed to bypass equipment used to control voltage levels or related circuit characteristics.

**System Isolation Equipment.**

A redundantly monitored, remotely operated contactor-isolating system, packaged to provide the disconnection/isolation function, capable of verifiable operation from multiple remote locations by means of lockout switches, each having the capability of being padlocked in the "off" (open) position. (430) (CMP-11)

**Tap Conductor.**

A conductor, other than a service conductor, that has overcurrent protection ahead of its point of supply that exceeds the value permitted for similar conductors that are protected as described elsewhere in 240.4. (240) (CMP-10)

**Task Illumination.**

Provisions for the minimum lighting required to carry out necessary tasks in the areas described in 517.34(A), including safe access to supplies and equipment and access to exits. [ 99: 3.3.177] (517) (CMP-15)

**Technical Power System.**

An electrical distribution system 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. (640) (CMP-12)

**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. (640) (CMP-12)

**Terminal (as applied to batteries).**

That part of a cell, container, or battery to which an external connection is made (commonly identified as post, pillar, pole, or terminal post). (CMP-13)

**Thermal Protector (as applied to motors).**

A protective device for assembly as an integral part of a motor or motor-compressor that, when properly applied, protects the motor against dangerous overheating due to overload and failure to start. (CMP-11)

Informational Note: The thermal protector may consist of one or more sensing elements integral with the motor or motor-compressor and an external control device.

**Thermal Resistivity.**

The heat transfer capability through a substance by conduction. (CMP-6)

Informational Note: Thermal resistivity is the reciprocal of thermal conductivity and is designated  $\rho$ , which is expressed in the units  $^{\circ}\text{C}\cdot\text{cm}/\text{W}$ .

**Thermally Protected (as applied to motors).**

A motor or motor-compressor that is provided with a thermal protector. (CMP-11)

**Top Shield.**

A grounded metal shield covering under-carpet components of the flat conductor cable (Type FCC) system for the purposes of providing protection against physical damage. (324) (CMP-6)

**Tower.**

A pole or other structure that supports a wind turbine. (694) (CMP-4)

**Transfer Switch.**

An automatic or nonautomatic device for transferring one or more load conductor connections from one power source to another. (CMP-13)

**Transfer Switch, Branch-Circuit Emergency Lighting. (Branch-Circuit Emergency Lighting Transfer Switch)**

A device connected on the load side of a branch-circuit overcurrent protective device that transfers only emergency lighting loads from the normal power source to an emergency power source. (700) (CMP-13)

Informational Note: See ANSI/UL 1008, *Transfer Switch Equipment*, for information covering branch-circuit emergency lighting transfer switches.

**Transfer Switch, Bypass Isolation. (Bypass Isolation Transfer Switch)**

A manual, nonautomatic, or automatic operated device used in conjunction with a transfer switch to provide a means of directly connecting load conductors to a power source and of disconnecting the transfer switch. (CMP-13)

**Transfer Switch, Meter-Mounted. (Meter-Mounted Transfer Switch)**

A transfer switch connected between the utility meter and the meter base. (CMP-13)

Informational Note: Meter-mounted transfer switches can plug into the meter base. Transfer switches that incorporate the meter base in the transfer equipment assembly are not considered meter-mounted transfer switches.

**Transformer.**

Equipment, either single-phase or polyphase, that uses electromagnetic induction to convert current and voltage in a primary circuit into current and voltage in a secondary circuit. (CMP-9)

**Transition Assembly.**

An assembly to facilitate connection of the flat conductor cable (Type FCC) system to other wiring systems, incorporating (1) a means of electrical interconnection and (2) a suitable box or covering for providing electrical safety and protection against physical damage. (324) (CMP-6)



**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. (626) (CMP-12)

**Transportable.**

X-ray equipment that is to be installed in a vehicle or that may be readily disassembled for transport in a vehicle. (660) (CMP-12)

**Truck.**

A motor vehicle designed for the transportation of goods, services, and equipment. (626) (CMP-12)

**Truck Coupler.**

A truck flanged surface inlet and mating cord connector. (626) (CMP-12)

**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. (626) (CMP-12)

**Trunk Cable.**

A portable extension cable containing six or more branch circuits, a male multipole plug, and a female multipole receptacle. (520) (CMP-15)

**Tubing, Electrical Metallic (EMT). (Electrical Metallic Tubing)**

An unthreaded thinwall 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 utilizing appropriate fittings. (CMP-8)

**Tubing, Electrical Nonmetallic (ENT). (Electrical Nonmetallic Tubing)**

A nonmetallic, pliable, corrugated raceway of circular cross section with integral or associated couplings, connectors, and fittings for the installation of electrical conductors. It is composed of a material that is resistant to moisture and chemical atmospheres and is flame retardant.

A pliable raceway is a raceway that can be bent by hand with a reasonable force but without other assistance. (CMP-8)

**Tubing, Flexible Metallic (FMT). (Flexible Metallic Tubing)**

A metal raceway that is circular in cross section, flexible, and liquidtight without a nonmetallic jacket. (CMP-8)

**Two-Fer.**

An assembly containing one male plug and two female cord connectors used to connect two loads to one branch circuit. (520) (CMP-15)

**Type of Protection “n”.**

Type of protection where electrical equipment, in normal operation, is not capable of igniting a surrounding explosive gas atmosphere and a fault capable of causing ignition is not likely to occur. (CMP-14)

Informational Note: See ANSI/UL 60079-15, *Explosive Atmospheres — Part 15: Equipment Protection by Type of Protection “n”*, for additional information.

**Ungrounded.**

Not connected to ground or to a conductive body that extends the ground connection. (CMP-5)

**Uninterruptible Power Supply (UPS).**

A device or system that provides quality and continuity of ac power through the use of a stored-energy device as the backup power source for a period of time when the normal power supply is incapable of performing acceptably. (CMP-13)

**Unit Equipment.**

A battery-equipped emergency luminaire that illuminates only as part of the emergency illumination system and is not illuminated when the normal supply is available. (CMP-13)

**Utilization Equipment.**

Equipment that utilizes electric energy for electronic, electromechanical, chemical, heating, lighting, or similar purposes. (CMP-1)

**Valve Actuator Motor (VAM) Assemblies.**

A manufactured assembly, used to operate a valve, consisting of an actuator motor and other components such as motor controllers, torque switches, limit switches, and overload protection. (430) (CMP-11)

Informational Note: VAMs typically have short-time duty and high-torque characteristics.

**Ventilated.**

Provided with a means to permit circulation of air sufficient to remove an excess of heat, fumes, or vapors. (CMP-14)

**Vessel.**

A container such as a barrel, drum, or tank for holding fluids or other material. (CMP-17)

**Volatile Flammable Liquid.**

A flammable liquid having a flash point below 38°C (100°F), or a flammable liquid whose temperature is above its flash point, or a Class II combustible liquid that has a vapor pressure not exceeding 276 kPa (40 psia) at 38°C (100°F) and whose temperature is above its flash point. (CMP-14)

**Voltage (of a circuit).**

The greatest root-mean-square (rms) (effective) difference of potential between any two conductors of the circuit concerned. (CMP-1)

Informational Note: Some systems, such as 3-phase 4-wire, single-phase 3-wire, and 3-wire direct current, may have various circuits of various voltages.

**Voltage, High. (High Voltage)**

A potential difference of more than 1000 volts, nominal. (CMP-9)

Informational Note: Circuits and equipment rated at potential differences of more than 1000 volts and up to 52 kV are also commonly referred to as medium voltage.

**Voltage, Low. (Low Voltage).**

An electromotive force rated 24 volts, nominal, or less. (551) (CMP-7)

**Voltage, Nominal. (Nominal Voltage)**

A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (e.g., 120/240 volts, 480Y/277 volts, 600 volts). (CMP-1)

Informational Note No. 1: The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of equipment.

Informational Note No. 2: See ANSI C84.1-2011, *Voltage Ratings for Electric Power Systems and Equipment* (60 Hz).

**Voltage, Nominal (as applied to battery or cell).(Nominal Voltage)**

The value assigned to a cell or battery of a given voltage class for the purpose of convenient designation. The operating voltage of the cell or battery may vary above or below this value. (CMP-13)

Informational Note: The most common nominal cell voltages are 2 volts per cell for the lead-acid batteries, 1.2 volts per cell for alkali batteries, and 3.2 to 3.8 volts per cell for Li-ion batteries. Nominal voltages might vary with different chemistries.

**Voltage to Ground.**

For grounded circuits, the voltage between the given conductor and that point or conductor of the circuit that is grounded; for ungrounded circuits, the greatest voltage between the given conductor and any other conductor of the circuit. (CMP-1)

**Watertight.**

Constructed so that moisture will not enter the enclosure under specified test conditions. (CMP-1)

**Weatherproof.**

Constructed or protected so that exposure to the weather will not interfere with successful operation. (CMP-1)

Informational Note: Rainproof, raintight, or watertight equipment can fulfill the requirements for weatherproof where varying weather conditions other than wetness, such as snow, ice, dust, or temperature extremes, are not a factor.

**Wharf.**

A structure at the shoreline that has a platform built along and parallel to a body of water with either an open deck or a superstructure. [ 307: 3.3.28] (555) (CMP-7)

**Wind Turbine.**

A mechanical device that converts wind energy to electrical energy. (CMP-4)

**Wind Turbine Output Circuit. (Turbine Output Circuit)**

The circuit conductors between the internal components of a wind turbine (which might include an alternator, integrated rectifier, controller, and/or inverter) and other equipment. (694) (CMP-4)

**Wire.**

A factory assembly of one or more insulated conductors without an overall covering. (805) (CMP-16)

**Wireless Power Transfer (WPT).**

The transfer of electrical energy from a power source to an electrical load via magnetic fields by a contactless means between a primary device and a secondary device. (625) (CMP-12)

**Wireless Power Transfer Equipment (WPTE).**

Equipment installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle without physical electrical contact. (625) (CMP-12)

Informational Note No. 1: The general form of WPTE consists of two physical packages: a control box and a primary pad.

Informational Note No. 2: Electric vehicle power export equipment and wireless power transfer equipment are sometimes contained in one set of equipment, sometimes referred to as a bidirectional WPTE.

**Wireways, Metal. (Metal Wireways)**

Sheet metal troughs with hinged or removable covers for housing and protecting electrical wires and cable and in which conductors are laid in place after the raceway has been installed as a complete system. (CMP-8)

**Wireways, Nonmetallic. (Nonmetallic Wireways)**

Flame-retardant, nonmetallic troughs with removable covers for housing and protecting electrical wires and cables in which conductors are laid in place after the raceway has been installed as a complete system. (CMP-8)

**Work Surface.**

A fixed, stationary, or portable surface typically intended for dry use and for tasks other than food preparation, personal lavation, or laundering that presents an incidental risk of spillage of smaller quantities of beverages and other liquids upon outlets mounted directly on or recessed in the surface. (CMP-2)

Informational Note No. 1: See UL 111, *Outline of Investigation for Multioutlet Assemblies*, and UL 962A, *Furniture Power Distribution Units*, which establish the performance evaluation criteria and construction criteria.

Informational Note No. 2: See 406.5(F), 406.5(G)(1), and 406.5(H) for information on receptacles for work surfaces distinguished from receptacles for counters and countertops.

**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. (645) (CMP-12)

**Statement of Problem and Substantiation for Public Input**

This definition is required for the definition of Equipment Leakage Current Interrupter.

**Related Public Inputs for This Document**

<b><u>Related Input</u></b>	<b><u>Relationship</u></b>
<u>Public Input No. 3910-NFPA 70-2023</u> <u>[Article 100]</u>	This public input is directly used in the definition of the related public input

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## Public Input No. 414-NFPA 70-2023 [ Definition: Distribution Point (Center Yard Pole) (Meter Po... ]

### Distribution Point (Center Yard Pole) (Meter Pole).

An electrical supply point from which ~~service drops~~ utility drops , service conductors, feeders, or branch circuits to buildings or structures utilized under single management are supplied. (547) (CMP-7)

Informational Note: The service point is typically located at the distribution point.

## Statement of Problem and Substantiation for Public Input

This PI is associated with several other PIs to recommend a global change from “service drop” to “utility drop” and from “service lateral” to “utility lateral.” “Service drop” appears 23 times in the Code and “service lateral” appears 15 times. There are 11 definitions that begin with the word ‘service.’ Of these, 9 are customer owned and only “service drop” and “service lateral” are utility owned and, therefore, outside the scope of the Code. “service drops” and “service laterals” are not service conductors as they do not fit the definition. Confining the word “service” to only those items that are customer owned would clear up much confusion on this topic. Appendix A shows UL 523 as having the title “telephone service drop wire” and the UL standard does, in fact, have that title. However, the text of UL 523 defines this wire as customer owned and Article 805 refers to this wire as a “drop wire.”

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<a href="#">Public Input No. 411-NFPA 70-2023 [Section No. 90.2(D)]</a>	Global change
<a href="#">Public Input No. 412-NFPA 70-2023 [Definition: Service Drop.]</a>	Global change
<a href="#">Public Input No. 413-NFPA 70-2023 [Definition: Service-Entrance Conductors.]</a>	Global change
<a href="#">Public Input No. 415-NFPA 70-2023 [Definition: Service Lateral.]</a>	Global change
<a href="#">Public Input No. 416-NFPA 70-2023 [Section No. 800.44(A)(4)]</a>	Global change
<a href="#">Public Input No. 417-NFPA 70-2023 [Section No. 700.12(F)]</a>	Global change
<a href="#">Public Input No. 418-NFPA 70-2023 [Section No. 701.12(F)]</a>	Global change
<a href="#">Public Input No. 419-NFPA 70-2023 [Section No. 770.44(A)(4)]</a>	Global change
<a href="#">Public Input No. 420-NFPA 70-2023 [Section No. 770.44(B)]</a>	Global change
<a href="#">Public Input No. 421-NFPA 70-2023 [Section No. 230.24(A)]</a>	Global change
<a href="#">Public Input No. 422-NFPA 70-2023 [Section No. 230.40]</a>	Global change
<a href="#">Public Input No. 423-NFPA 70-2023 [Section No. 250.24(A)(1)]</a>	Global change

[Public Input No. 424-NFPA 70-2023 \[Section No. 250.24\(F\)\]](#)

Global  
change

[Public Input No. 425-NFPA 70-2023 \[Section No. 250.64\(D\)\(1\)\]](#)

Global  
change

[Public Input No. 426-NFPA 70-2023 \[Section No. 250.66 \[Excluding any Sub-Sections\]\]](#)

Global  
change

[Public Input No. 411-NFPA 70-2023 \[Section No. 90.2\(D\)\]](#)

[Public Input No. 412-NFPA 70-2023 \[Definition: Service Drop.\]](#)

[Public Input No. 413-NFPA 70-2023 \[Definition: Service-Entrance Conductors.\]](#)

[Public Input No. 415-NFPA 70-2023 \[Definition: Service Lateral.\]](#)

[Public Input No. 416-NFPA 70-2023 \[Section No. 800.44\(A\)\(4\)\]](#)

[Public Input No. 417-NFPA 70-2023 \[Section No. 700.12\(F\)\]](#)

[Public Input No. 418-NFPA 70-2023 \[Section No. 701.12\(F\)\]](#)

[Public Input No. 419-NFPA 70-2023 \[Section No. 770.44\(A\)\(4\)\]](#)

[Public Input No. 420-NFPA 70-2023 \[Section No. 770.44\(B\)\]](#)

[Public Input No. 421-NFPA 70-2023 \[Section No. 230.24\(A\)\]](#)

[Public Input No. 422-NFPA 70-2023 \[Section No. 230.40\]](#)

[Public Input No. 423-NFPA 70-2023 \[Section No. 250.24\(A\)\(1\)\]](#)

[Public Input No. 424-NFPA 70-2023 \[Section No. 250.24\(F\)\]](#)

[Public Input No. 425-NFPA 70-2023 \[Section No. 250.64\(D\)\(1\)\]](#)

[Public Input No. 426-NFPA 70-2023 \[Section No. 250.66 \[Excluding any Sub-Sections\]\]](#)

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## Public Input No. 721-NFPA 70-2023 [ Definition: Recreational Vehicle (RV) (Camping Trailer) (Mo... ]

### **Recreational Vehicle (RV) (Camping Trailer) (Motor Home) (Travel Trailer) (Truck Camper).**

A vehicle or slide-in camper that is primarily designed as temporary living quarters for recreational, camping, or seasonal use; has its own motive power or is mounted on or towed by another vehicle; is regulated by the National Highway Traffic Safety Administration as a vehicle or vehicle equipment; does not require a special highway use permit for operation on the highways; and can be easily transported and set up on a daily basis by an individual. Excludes vehicles (such as camper vans, plug-in electric vehicles, and aircraft which have the power source of their on-board 120/240-volt receptacles inverted exclusively from the vehicle's battery charging system) which cannot connect its on-board receptacles directly with the utility grid. [1192:3.3.52] (551) (CMP-7)

Informational Note: See NFPA 1192, *Standard on Recreational Vehicles*, Informative Annex A, for product types and definitions for motor homes and towable recreational vehicles.

### **Statement of Problem and Substantiation for Public Input**

Stated that plug-in electric vehicles with 120/240-volt outlets (such as those in Ford F-150 Lightning used for camping) do not count as RVs. Even though on-board EVPE receptacles fall under the scope of the NEC, those relatively low-powered receptacles mentioned aren't for EVPE. The F-150 Lightning (or any other EV with vehicle to home capability) instead does bidirectional charging for EVPE (vehicle to home) via its high-powered SAE J1772 receptacle.

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**Committee:** NEC-P07



## Public Input No. 2560-NFPA 70-2023 [ Definition: Recreational Vehicle Park. ]

### Recreational Vehicle Park.

Any parcel or tract of land under the control of any person, organization, or governmental entity wherein ~~two or~~ one or more recreational vehicle, recreational park trailer, and/or other camping sites are offered for use by the public or members of an organization for overnight stays. (551) (CMP-7)

### Statement of Problem and Substantiation for Public Input

The current definition of a "Recreational Vehicle Park" contains the following language: "Any parcel or tract of land under the control of any person, organization, or governmental entity wherein TWO or more recreational vehicle, recreation park trailer, and/or other camping sites are offered for use by the public or members of an organization for overnight stays."

I have offered a slight change to the definition in order to resolve the following problems:

1. Electrical contractors, electricians, and inspectors are interpreting the requirements of Article 551 as not applying to SINGLE space Recreational Vehicle sites.
2. The Scope of Article 551 states that this article covers.....electrical installations within a recreational vehicle park, which is defined in Article 100 as having TWO or more sites.
3. Particularly referring to Article 551, Part VI, the title of which is "Recreational Vehicle Parks", it is being construed that this Part does not apply to SINGLE space Recreational Vehicle sites.
4. The Demand Factors in Table 551.73 (A) refer to 1 as being a number of Recreational Vehicle Sites, but this is inaccurate since a Recreational Vehicle Park is defined as TWO or more recreational vehicle.....sites.
5. Singular language is used throughout Article 551 to describe requirements for a SINGLE Recreational Vehicle Site:
  - a. "every recreational vehicle site."
  - b. "per site."
  - c. "Recreational Vehicle Site Supply Equipment."

I believe that Code-Making Panel No.7 intended for Article 551 to apply to a single site, or any number of sites which are installed to provide electrical power for a Recreational Vehicle. By making a minor change to the definition in Article 100, I believe this will correct any misinterpretations concerning the requirements of this important Article.

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**Committee:** NEC-P07



## Public Input No. 722-NFPA 70-2023 [ Definition: Shore Power. ]

### Shore Power.

The electrical equipment required to power a floating vessel or other vehicle including, but not limited to, the receptacle and cords. (555) (CMP-7)

### Statement of Problem and Substantiation for Public Input

added that shore power is also a standard used term in other industries, such as aviation and RVs

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**Committee:** NEC-P07



## Public Input No. 594-NFPA 70-2023 [ Definition: Structure, Relocatable.

### (Relocatable Structure) ]

#### Structure, Relocatable. (Relocatable Structure)

A factory-assembled structure or structures transportable in one or more sections that are built on a permanent chassis and designed to be used as other than a dwelling unit without a permanent foundation. (545) (CMP-7)

Informational Note: Examples of relocatable structures are those units that are equipped for sleeping purposes only, contractor's and other on-site offices, construction job dormitories, studio dressing rooms, banks, clinics, stores, shower facilities and restrooms, training centers, concession trailers, vending carts, food trucks, food trailers or for the display or demonstration of merchandise or machines.

### Statement of Problem and Substantiation for Public Input

Article 525 needs to define portable structures to include food concession trailers, food trucks, game trailer concessions etc, when set up at the fairs festival and similar events. hopefully this can clearly allow enforcement to keep wiring subject to general public interaction able to be inspected and safe.

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## Public Input No. 1210-NFPA 70-2023 [ Definition: Voltage, Low. (Low Voltage).

]

### Voltage, Low. (Low Voltage).

An electromotive force rated 24-volts less than 50 volts , nominal, ~~or less~~ . (551) (CMP-7)

## Statement of Problem and Substantiation for Public Input

NEC section 110.27(A) states "live parts of electrical equipment operating at 50 to 1000 volts shall be guarded against accidental contact by approved enclosures ..." NFPA 70E section 110.3 states "Energized electrical conductors and circuit parts operating at voltages equal to or greater than 50 volts shall be put into an electrically safe work condition before an employee performs work ..." The term "low voltage" is interpreted as not an electrical shock hazard. The definition for Low Voltage must be consistent with NFPA 70 and 70E.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 1208-NFPA 70-2023 [New Definition after Definition: Voltage, High. (High Volta...]</u>	voltage definition
<u>Public Input No. 1207-NFPA 70-2023 [New Definition after Definition: Voltage, High. (High Volta...]</u>	voltage definition

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## Public Input No. 2283-NFPA 70-2023 [ Definition: Voltage, Low. (Low Voltage).

]

### **~~Voltage, Low. (Low Voltage).~~**

~~An electromotive force rated 24 volts, nominal, or less. (551) (CMP-7)~~

## Statement of Problem and Substantiation for Public Input

This definition only applies to Article 551 but it is not needed for the application of requirements in that Article. Section 551.4 (General Requirements) part (B) was revised in 2005 to remove Part II (551.10, which included all of the low voltage requirements) and replace it with an informational note that points to NFPA 1192 and ANSI/RVIA 12V. With that change, there are no requirements within Article 551 addressing low voltage equipment. The informational notes associated with 551.1 and 551.4(B) refer to NFPA 1192 and ANSI/RVIA LV-2020, where the applicable voltage limits are provided.

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**Committee:** NEC-P07





## Public Input No. 584-NFPA 70-2023 [ Definitions (100): Feeder.... to Feeder Asse... ]

### Definitions (100): Feeder.... to Feeder Asse...

#### Feeder.

All circuit conductors between the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent device. (CMP-10)

#### Feeder Assembly.

The overhead or under-chassis feeder conductors, including the equipment grounding conductor, together with the necessary fittings and equipment; or the power-supply cord assembly for a mobile home, recreational vehicle, or park trailer, identified for the delivery of energy from the source of electrical supply to the panelboard within the mobile home, recreational vehicle, or park trailer. (CMP-7)

Any parallel feeder to panels, more than one conductor per phase, should be solid color conductors.

### Statement of Problem and Substantiation for Public Input

This would be a big help, not just for inspector, but for the electrician to be certain that they do not have any cross connections to feeders.

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**Committee:** NEC-P07



## Public Input No. 3233-NFPA 70-2023 [ New Definition after Definition: Electrical Life Support Eq... ]

### TITLE OF NEW CONTENT

Electrical Management System (EMS) A device intended to monitor the electrical supply and systems of a recreational vehicle for potential dangerous conditions and disconnect electrical conductors if detected. (CMP-7)

Informational Note: Electrical Management Systems (EMS) can be contained and integral to other recreational vehicle power distribution equipment such as inverters, transfer switches, and panel boards.

### Statement of Problem and Substantiation for Public Input

As of the deadline date (September 07, 2023) of public input to the 2026 edition of the NEC, there is not a published listing standard to evaluate a grounding monitor interrupter device against. The recreational vehicle industry has existing aftermarket and OEM installed products that perform similar functionality to the intended protection level of a grounding monitor interrupter. The expansion from only a ground monitor interrupter to an EMS will provide a better level of protection to the recreational vehicle user.

### Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<a href="#">Public Input No. 3229-NFPA 70-2023 [Section No. 551.40(D)]</a>	Dependent

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## Public Input No. 4434-NFPA 70-2023 [ New Definition after Definition: Ground-Fault Circuit Inter... ]

### Equipment Ground-Fault Protective Device (EGFPD)

A device intended for the detection of sensitive ground-fault currents, when the selectable ground-fault pick-up level is 6mA or up to 100mA, and interrupts a faulted circuit in accordance to the time intervals established by a Class A device.

#### Informational Note:

See UL Category FTTE, *Equipment Ground-Fault Protective Devices* , for further information. This product category is listed according to requirements in UL 1053, *Standard for Ground-Fault Sensing and Relaying Equipment* , and UL 943, *Standard for Ground-Fault Circuit Interrupters* .

## Statement of Problem and Substantiation for Public Input

This definition is being added as a supplement to Public Input 4403 for revisions to 555.35.

Personnel protection requires speed that GFPE devices are not tested or certified to. So if the intent is to protect humans from Electric Shock Drowning Incidents, and the minimum pickup threshold needs to be raised to 30mA at the pedestal and 100mA at the feeder for compatibility with boats, then the speed at which those protective devices operate should still follow the personnel protection formula of UL 943.

EGFPDs are different devices than GFPE. While officially they cannot be considered personnel level protection, because of their adjustable settings, they are tested and certified to follow the personnel protection curve of UL 943.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<a href="#">Public Input No. 4403-NFPA 70-2023 [Section No. 555.35]</a>	

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**Submittal Date:** Thu Sep 07 15:18:18 EDT 2023

**Committee:** NEC-P07



## Public Input No. 4440-NFPA 70-2023 [ New Definition after Definition: Ground-Fault Circuit Inter... ]

### Grounding Monitor/Interrupter (GM/I)

A device intended to monitor equipment grounding conductor continuity, that functions to prevent energization of a circuit under conditions where the grounding is not available, and causes the circuit to be interrupted where the equipment grounding is lost or compromised during operation.

#### Informational Note:

See UL 943C, Outline of Investigation for Special Purpose Ground-Fault Circuit Interrupters, for information on Grounding Monitor/Interrupters.

## Statement of Problem and Substantiation for Public Input

This definition is a supplement to Public Input 4403 for revisions to 555.35.

Many of the incidents relating to shock, and ESD incidents in the marina environment are related to improper grounding (or lack thereof). The UL 943C Outline of Investigation for Special Purpose GFCI implements a requirement for Grounding Monitor/Interruption (GM/I) in applications where proper grounding is required. There are already commercially available EGFPD products that are dual equipped with the GM/I rated up to 100A. The GM/I feature does require an extra conductor to perform ground integrity, and would likely not be possible at the pedestal level as it would require standardization of cords and plugs for each boat. However, this proactive technology could be implemented at the feeder level, to monitor the effective ground path between the distribution panel and each pedestal.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 4403-NFPA 70-2023 [Section No. 555.35]	

## Submitter Information Verification

**Submitter Full Name:** Tim Piemonte

**Organization:** Littelfuse

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**Submittal Date:** Thu Sep 07 15:25:42 EDT 2023

**Committee:** NEC-P07



**Public Input No. 3114-NFPA 70-2023 [ New Section after 220.102 ]**

## Part VII Recreational Vehicle Parks

### 220.130 Calculated Load.

#### (A) Basis of Calculations.

Electrical services and feeders shall be calculated on the basis of not less than all of the following:

- (1) 12,000 volt-amperes per site equipped with 50-ampere, 208Y/120-volt or 120/240-volt supply facilities
- (2) 3600 volt-amperes per site equipped with both 20-ampere and 30-ampere supply facilities
- (3) 2400 volt-amperes per site equipped with only 20-ampere supply facilities
- (4) 600 volt-amperes per site equipped with only 20-ampere supply facilities that are dedicated to tent sites

The demand factors set forth in Table 220.130 (A) shall be the minimum allowable demand factors that shall be permitted in calculating load for service and feeders. Where the electrical supply for a recreational vehicle site has more than one receptacle.

Where the electrical supply is in a location that serves two recreational vehicles, the equipment for both sites shall comply with 551.77, and the calculated load shall only be calculated for the two receptacles with the highest rating.

#### (B) Demand Factors.

The demand factor for a given number of sites shall apply to all sites indicated. For example, 20 sites calculated at 45 percent of 3600 volt-amperes results in a permissible demand of 1620 volt-amperes per site or a total of 32,400 volt-amperes for 20 sites.

Informational Note: These demand factors may be inadequate in areas of extreme hot or cold temperatures for heating or air conditioning.

Table 220.130 (A) Demand Factors for Site Feeders and Service-Entrance Conductors for

<u>Number of Recreational</u>	<u>Demand Factor</u>
<u>Vehicle Sites</u>	<u>(%)</u>
<u>1</u>	<u>100</u>
<u>2</u>	<u>90</u>
<u>3</u>	<u>80</u>
<u>4</u>	<u>75</u>
<u>5</u>	<u>65</u>
<u>6</u>	<u>60</u>
<u>7-9</u>	<u>55</u>
<u>10-12</u>	<u>50</u>
<u>13-15</u>	<u>48</u>
<u>16-18</u>	<u>47</u>
<u>19-21</u>	<u>45</u>

Informational Note: These demand factors may be inadequate in areas of extreme hot or cold temperatures for heating or air conditioning.

Table 220.130 (A) Demand Factors for Site Feeders and Service-Entrance Conductors for

<u>Number of Recreational</u>	<u>Demand Factor</u>
<u>Vehicle Sites</u>	<u>(%)</u>
<u>22–24</u>	<u>43</u>
<u>25–35</u>	<u>42</u>
<u>36 plus</u>	<u>41</u>

Loads for other amenities such as, but not limited to, service buildings, recreational buildings, and swimming pools shall be calculated separately and then be added to the value calculated for the recreational vehicle sites where they are all supplied by a common service.

## Statement of Problem and Substantiation for Public Input

Adding add new Part VII to Article 220 titled Recreational Vehicle Park Load Calculations. In the 2023 NEC a new Part VI for healthcare load calculation was added and a new Part VII for marina load calculation was to Article 220, this is a similar public input for new section 220.130. This relocation will group the load calculation for this special type of occupancy where it belongs in Article 220.

## Submitter Information Verification

**Submitter Full Name:** Mike Holt

**Organization:** Mike Holt Enterprises Inc

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**Submittal Date:** Tue Aug 29 12:30:11 EDT 2023

**Committee:** NEC-P07





## Public Input No. 2796-NFPA 70-2023 [ New Section after 545.1 ]

### 545.2 Listing Requirements.

All raceway and cable wiring methods included in this Code and other wiring systems specifically intended and listed for use in manufactured buildings shall be permitted with listed fittings and with fittings listed and identified for manufactured buildings.

## Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document when general listing requirements are covered within an article. The NEC Style Manual Section 2.2.1 Parallel Numbering Required, states that technical committees shall use the following section numbers for the same purposes within articles.

The listing requirements are to be located in the .2 section.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 2795-NFPA 70-2023</u> <u>[Section No. 545.4]</u>	Deleted and relocated listing requirements to the .2 section
<u>Public Input No. 2795-NFPA 70-2023</u> <u>[Section No. 545.4]</u>	

## Submitter Information Verification

**Submitter Full Name:** Dean Hunter

**Organization:** Minnesota Department of Labor

**Street Address:**

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**Submittal Date:** Fri Aug 25 11:15:32 EDT 2023

**Committee:** NEC-P07

**Public Input No. 2795-NFPA 70-2023 [ Section No. 545.4 ]****545.4 Wiring Methods.**

~~(B)–~~

(A)–

~~Methods Permitted.~~

~~All raceway and cable wiring methods included in this Code and other wiring systems specifically intended and listed for use in manufactured buildings shall be permitted with listed fittings and with fittings listed and identified for manufactured buildings.~~

**~~Securing Cables.~~**

~~In closed construction, cables shall be permitted to be secured only at cabinets, boxes, or fittings where 10 AWG or smaller conductors are used and protection against physical damage is provided.~~

**Statement of Problem and Substantiation for Public Input**

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document when general listing requirements are covered within an article. The NEC Style Manual Section 2.2.1 Parallel Numbering Required, states that technical committees shall use the following section numbers for the same purposes within articles.

The listing requirements are to be located in the .2 section.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

**Related Public Inputs for This Document**

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 2796-NFPA 70-2023 [New Section after 545.1]</u>	Relocated text.
<u>Public Input No. 2796-NFPA 70-2023 [New Section after 545.1]</u>	

**Submitter Information Verification**

**Submitter Full Name:** Dean Hunter

**Organization:** Minnesota Department of Labor

**Street Address:**

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**State:**

**Zip:**

**Submittal Date:** Fri Aug 25 11:13:48 EDT 2023

**Committee:** NEC-P07

**Public Input No. 2040-NFPA 70-2023 [ Section No. 545.22(D) ]****(D) Grounding.**

The equipment grounding conductor shall be sized in accordance with 250.122. Any installed grounded conductor shall not be connected to the equipment grounding conductor.

**(1) Feeders.**

The feeder(s) shall be grounded in accordance with Parts I, and II, ~~and III~~ of Article 250.

**~~(2) Two or More Relocatable Structures.~~**

~~Where two or more relocatable structures are structurally connected to form a single unit, and a common grounding electrode conductor and tap arrangement as specified in 250.64(D)(1) is utilized, it shall be permitted to use the chassis bonding conductor specified in 545.26 as the tap conductor.~~

**Statement of Problem and Substantiation for Public Input**

This public input is being submitted on behalf of the Minnesota Department of Labor and Industry. Currently, the Department's inspection staff includes 14-office/field staff, 12-state field inspectors, 2-virtual inspectors and 50 plus contract electrical inspectors that complete over 170,000 electrical inspections annually.

The proposed language clarifies the equipment grounding sizing requirements and addresses the need for the grounded conductor to be separated from the equipment grounding conductor in these types of structures.

Section (D)(1) included Part III of Article 250 which would require a grounding electrode system. A relocatable structure should be treated similarly to a mobile or manufactured home without a permanent foundation.

Section (D)(2) is deleted and relocated to section 545.26 as the intent is bonding and not grounding. See companion proposal for 545.26.

**Related Public Inputs for This Document**

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 2041-NFPA 70-2023 [Section No. 545.26]</u>	Relocated text deleted from 545.22(D)(2).
<u>Public Input No. 2041-NFPA 70-2023 [Section No. 545.26]</u>	

**Submitter Information Verification**

**Submitter Full Name:** Dean Hunter

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<b>Submittal Date:</b>	Fri Aug 11 11:16:33 EDT 2023
<b>Committee:</b>	NEC-P07



## Public Input No. 2758-NFPA 70-2023 [ Section No. 545.22(D) ]

(D) Grounding.

(1) Feeders.

The feeder(s) shall be grounded in accordance with Article 250, Parts I, II, and III- of Article 250 .

(2) Two or More Relocatable Structures.

Where two or more relocatable structures are structurally connected to form a single unit, and a common grounding electrode conductor and tap arrangement as specified in 250.64(D)(1) is utilized, it shall be permitted to use the chassis bonding conductor specified in 545.26 as the tap conductor.

### Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.

4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

### Submitter Information Verification

**Submitter Full Name:** David Williams

**Organization:** Delta Charter Township

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**Submittal Date:** Thu Aug 24 20:12:02 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2041-NFPA 70-2023 [ Section No. 545.26 ]

### **545.26** Bonding of Exposed Non–Current-Carrying Metal Parts.

All exposed non–current-carrying metal parts that are likely to become energized shall be effectively bonded to the grounding terminal or enclosure of the panelboard. A bonding conductor shall be connected between the panelboard and an accessible terminal on the chassis. Chassis of multiple relocatable structure sections shall be bonded together with a solid copper, 8 AWG minimum, insulated or bare, bonding conductor with terminations in accordance with 250.8 and 250.12.

### Statement of Problem and Substantiation for Public Input

This public input is being submitted on behalf of the Minnesota Department of Labor and Industry. Currently, the Department's inspection staff includes 14-office/field staff, 12-state field inspectors, 2-virtual inspectors and 50 plus contract electrical inspectors that complete over 170,000 electrical inspections annually.

This proposed language is consistent with 550.16(C). A relocatable structure should be bonded in the same manner as a mobile or manufactured home.

### Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 2040-NFPA 70-2023 [Section No. 545.22(D)]</u>	Deleted text is relocated to 545.26.
<u>Public Input No. 2040-NFPA 70-2023 [Section No. 545.22(D)]</u>	

### Submitter Information Verification

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**Zip:**  
**Submittal Date:** Fri Aug 11 11:20:30 EDT 2023  
**Committee:** NEC-P07



## Public Input No. 3369-NFPA 70-2023 [ New Section after 547.4 ]

### 547.15 Replacement of Equipment.

When modifications or replacements of electrical enclosures, devices, or wiring methods are necessary in facilities where dust with water may accumulate or a corrosive atmosphere exists, they shall be required to comply with the requirements of this Code. Existing equipment that has been damaged shall be identified, and serviced or replaced by a qualified person to the minimum requirements of the edition of this Code to which it was originally installed.

### Statement of Problem and Substantiation for Public Input

1. Agricultural buildings can present a harsh environment for electrical equipment. High humidity levels, corrosive chemicals, and corrosive gases can lead to corrosion of enclosures, connectors, and conductors which may lead to properly installed equipment to become unsafe over time. Requiring an inspection of circuits when equipment is being replaced or there is a modification being made to the circuit will locate deteriorating equipment before it becomes a safety hazard.

2. Replacement of Equipment Marinas, Boatyards, Floating Buildings, and Commercial and Noncommercial Docking Facilities has already been implemented in section 555.15. Agricultural buildings should be held to this requirement to reduce hazards.

3. Examples of load centers exposed to Agricultural environment/conditions:  
[https://esasafe.com/assets/files/esasafe/pdf/Electrical\\_Safety\\_Products/Guidelines/ESA\\_-\\_Farm\\_Brochure\\_-\\_Final\\_tagged\\_FINAL-ua\\_80136.pdf](https://esasafe.com/assets/files/esasafe/pdf/Electrical_Safety_Products/Guidelines/ESA_-_Farm_Brochure_-_Final_tagged_FINAL-ua_80136.pdf)  
<https://www.producer.com/news/bad-wiring-called-major-fire-threat-in-barns/>  
<https://www.heartlandfarmmutual.com/wp-content/uploads/2020/09/Electrical-Systems-in-Barns.pdf>

4. Examples of Fires causes by electrical malfunction:  
[https://www.loudountimes.com/news/electrical-malfunction-blamed-for-purcellville-blaze/article\\_147a7e74-4504-11ed-839f-6fa53222a782.html](https://www.loudountimes.com/news/electrical-malfunction-blamed-for-purcellville-blaze/article_147a7e74-4504-11ed-839f-6fa53222a782.html)  
<https://foxbaltimore.com/news/local/barn-fire-in-salisbury-caused-by-electrical-circuit-failure-fire-officials-say>  
<https://patch.com/virginia/leesburg/barn-fire-causes-300-000-damage-lovettsville>  
<https://globalnews.ca/news/3963537/electrical-problem-may-have-caused-barn-fire/>  
[https://www.berkshireeagle.com/archives/electrical-problem-caused-pownal-barn-fire/article\\_e260fd89-dd8e-5ba0-8670-14ce685290d7.html](https://www.berkshireeagle.com/archives/electrical-problem-caused-pownal-barn-fire/article_e260fd89-dd8e-5ba0-8670-14ce685290d7.html)

### Submitter Information Verification

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**Street Address:**  
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**Zip:**  
**Submittal Date:** Fri Sep 01 15:16:48 EDT 2023



<b>Committee:</b> NEC-P07
---------------------------



## Public Input No. 2759-NFPA 70-2023 [ Section No. 547.4 ]

### 547.4 Surface Temperatures.

Electrical equipment or devices installed in accordance with this article shall be installed in a manner such that they will function at full rating without developing surface temperatures in excess of the specified normal safe operating range of the equipment or device.

Informational Note: See ~~Part III~~ of Article 502, Part III for use of equipment in Class 2 locations.

## Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.

4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

## Submitter Information Verification

**Submitter Full Name:** David Williams

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**Submittal Date:** Thu Aug 24 20:12:49 EDT 2023

**Committee:** NEC-P07



## Public Input No. 4173-NFPA 70-2023 [ Section No. 547.4 ]

### **547.4** Surface Temperatures.

Electrical equipment or devices installed in accordance with this article shall be installed in a manner such that they will function at full rating without developing surface temperatures in excess of the specified normal safe operating range of the equipment or device.

Informational Note: See Part III of Article 502 for use of equipment in ~~Class 2~~  
~~locations~~ Class II locations .

### Statement of Problem and Substantiation for Public Input

Class 2 is a limited energy power source. Class II is a type of hazardous location.

### Submitter Information Verification

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**Submittal Date:** Wed Sep 06 19:24:07 EDT 2023

**Committee:** NEC-P07



## Public Input No. 4185-NFPA 70-2023 [ Section No. 547.23 ]

### **547.23** Damp or Wet Locations.

(A) Prevent Moisture. In damp or wet locations, equipment enclosures, boxes, conduit bodies, and fittings shall be placed or equipped so as to prevent moisture from entering or accumulating within the enclosure, box, conduit body, or fitting.

(B) Listed. In wet locations, including normally dry or damp locations where surfaces are periodically washed or sprayed with water, boxes, conduit bodies, and fittings shall be listed for use in wet locations, and equipment enclosures shall be weatherproof.

### Statement of Problem and Substantiation for Public Input

Breaking up 547.23 into a list item format to facilitate understanding for Code users. In accordance with NFPA Style Manual section 3.5.1.2 additional subdivisions shall be used where multiple requirements can be broken into independent requirements.

### Submitter Information Verification

**Submitter Full Name:** Mike Holt

**Organization:** Mike Holt Enterprises Inc

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**Zip:**

**Submittal Date:** Wed Sep 06 20:16:48 EDT 2023

**Committee:** NEC-P07



## Public Input No. 163-NFPA 70-2023 [ Section No. 547.26 ]

### **547.26** Physical Protection.

All electrical wiring and equipment subject to physical damage shall be protected.

Nonmetallic cables and LFNC raceways shall not be permitted to be concealed within walls and above ceilings of buildings (i.e., offices, lunchrooms, ancillary areas, etc.) or portions thereof, which are contiguous with or physically adjoined to livestock confinement areas.

Informational Note: Rodents and other pests are common around such installations and will damage nonmetallic cable by chewing the cable jacket and conductor insulation concealed within walls and ceilings of livestock containment areas of agricultural buildings.

### Statement of Problem and Substantiation for Public Input

LFNC raceways have a soft plastic construction very similar to Nonmetallic cables. The same restrictions should apply to LFNC raceway in a concealed location.

### Submitter Information Verification

**Submitter Full Name:** Matt Bednarik

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**City:**

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**Zip:**

**Submittal Date:** Sat Jan 14 23:51:36 EST 2023

**Committee:** NEC-P07



## Public Input No. 4187-NFPA 70-2023 [ Section No. 547.26 ]

### **547.26** Physical Protection.

(A) Protection from Physical Damage. All electrical wiring and equipment subject to physical damage shall be protected.

(B) Nonmetallic Cables. Nonmetallic cables shall not be permitted to be concealed within walls and above ceilings of buildings (i.e., offices, lunchrooms, ancillary areas, etc.) or portions thereof, which are contiguous with or physically adjoined to livestock confinement areas.

Informational Note: Rodents and other pests are common around such installations and will damage nonmetallic cable by chewing the cable jacket and conductor insulation concealed within walls and ceilings of livestock containment areas of agricultural buildings.

### Statement of Problem and Substantiation for Public Input

Breaking up 547.26 into a list item format to facilitate understanding for Code users. In accordance with NFPA Style Manual section 3.5.1.2 additional subdivisions shall be used where multiple requirements can be broken into independent requirements.

### Submitter Information Verification

**Submitter Full Name:** Mike Holt

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**Submission Date:** Wed Sep 06 20:19:20 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1152-NFPA 70-2023 [ Section No. 547.40 ]

### **547.40** Electrical Supply to Building(s) or Structure(s) from a Distribution Point.

Any agricultural building or structure for livestock located on the same premises shall be supplied from a distribution point. More than one distribution point on the same premises shall be permitted.

Any existing agricultural building or structure for other than livestock not under the scope of ~~Article 547 shall~~ this article shall be permitted to be supplied in accordance with 250.32(B)(1), Exception No. 1.

### Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the NEC® Style Manual prohibits reference to an entire article other than Article 100 or where required for context. As such, it is recommended to simply reference "this article" here to comply with the style manual without altering the meaning of the requirement.

### Submitter Information Verification

**Submitter Full Name:** Richard Holub

**Organization:** The DuPont Company, Inc.

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**Submittal Date:** Tue Jun 20 14:18:47 EDT 2023

**Committee:** NEC-P07





## Public Input No. 2042-NFPA 70-2023 [ Section No. 547.40 ]

### **547.40** Electrical Supply to Building(s) or Structure(s) from a Distribution Point.

Any agricultural building or structure for livestock located on the same premises shall be supplied from a distribution point. More than one distribution point on the same premises shall be permitted.

~~Any existing agricultural building or structure for other than livestock not under the scope of Article 547 shall be permitted to be supplied in accordance with 250.32(B)(1), Exception No. 1.~~

## Statement of Problem and Substantiation for Public Input

This public input is being submitted on behalf of the Minnesota Department of Labor and Industry. Currently, the Department's inspection staff includes 14-office/field staff, 12-state field inspectors, 2-virtual inspectors and 50 plus contract electrical inspectors that complete over 170,000 electrical inspections annually.

This proposed change would eliminate the allowance for any existing 3-wire distribution to ag related buildings or structures (ground/neutral bond) on a livestock premises. Stray voltage can come from all sources of power on a premises when we bond any system grounded conductor to a grounding electrode system. Other ag buildings or structures with a 3-wire system on a premise can potentially contribute to additional voltage being present on the equipotential plane.

## Submitter Information Verification

**Submitter Full Name:** Dean Hunter

**Organization:** Minnesota Department of Labor

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**City:**

**State:**

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**Submittal Date:** Fri Aug 11 11:26:14 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2760-NFPA 70-2023 [ Section No. 547.41(A)(5) ]

### (5) Rating.

The site-isolating device shall be rated for the calculated load as determined by article 220, Part V- of Article- 220 .

## Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.

4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

## Submitter Information Verification

**Submitter Full Name:** David Williams

**Organization:** Delta Charter Township

**Street Address:**

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**Submittal Date:** Thu Aug 24 20:13:49 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2761-NFPA 70-2023 [ Section No. 547.41(B) ]

### (B) Service Disconnecting Means and Overcurrent Protection at the Building(s) or Structure(s).

Where the service disconnecting means and overcurrent protection are located at the building(s) or structure(s), the requirements of 547.41(B)(1) through (B)(3) shall apply.

#### (1) Conductor Sizing.

The supply conductors shall be sized in accordance with ~~Part V of~~ Article 220 , Part V .

#### (2) Conductor Installation.

The supply conductors shall be installed in accordance with ~~Part II of~~ Article 225 , Part II .

#### (3) Grounding and Bonding.

For each building or structure, grounding and bonding of the supply conductors shall be in accordance with 250.32, and the following conditions shall be met:

- (1) The equipment grounding conductor is not smaller than the largest supply conductor if of the same material or is adjusted in size in accordance with the equivalent size columns of Table 250.122 if of different materials.
- (2) The equipment grounding conductor is connected to the grounded circuit conductor and the site-isolating device enclosure at the distribution point.

## Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.

4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

## Submitter Information Verification

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**Submittal Date:** Thu Aug 24 20:14:30 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2762-NFPA 70-2023 [ Section No. 547.42 ]

### **547.42** Service Disconnecting Means and Overcurrent Protection at the Distribution Point.

The service disconnecting means and overcurrent protection for each set of feeders or branch circuits shall be located at the distribution point. The service disconnecting means shall be installed in accordance with ~~Part VI of Article 230~~ , Part VI . The feeders or branch circuits supplied to buildings or structures shall comply with 250.32 and Article 225, Parts I and II.

Informational Note: Methods to reduce neutral-to-earth voltages in livestock facilities include supplying buildings or structures with 4-wire single-phase services, sizing 3-wire single-phase service and feeder conductors to limit voltage drop to 2 percent, and connecting loads line-to-line, will provide reasonable efficiency of operation.

### Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.

4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

### Submitter Information Verification

**Submitter Full Name:** David Williams

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**City:**

**State:**

**Zip:**

**Submittal Date:** Thu Aug 24 20:15:49 EDT 2023

**Committee:** NEC-P07



## Public Input No. 640-NFPA 70-2023 [ Section No. 547.44 ]

### **547.44– 32** Equipotential Planes and Bonding of Equipotential Planes.

The installation and bonding of equipotential planes shall comply with 547.44(A) and (B). For the purposes of this section, the term *livestock* shall not include poultry.

#### **(A)** Where Required.

Equipotential planes shall be required in the following areas:

##### **(1)** Indoors.

Equipotential planes shall be installed in confinement areas with concrete floors where metallic equipment is located that may become energized and is accessible to livestock.

##### **(2)** Outdoors.

Equipotential planes shall be installed in concrete slabs where metallic equipment is located that may become energized and is accessible to livestock.

The equipotential plane shall encompass the area where the livestock stands while accessing metallic equipment that may become energized.

#### **(B)** Bonding.

Equipotential planes shall be bonded to the grounding electrode system or an equipment grounding terminal in any panelboard of the electrical grounding system associated with the equipotential plane. The bonding conductor shall be solid copper, insulated, covered or bare, and not smaller than 8 AWG. The means of bonding to wire mesh or conductive elements shall be by pressure connectors or clamps of brass, copper, copper alloy, or other approved means. Slatted floors that are supported by structures that are a part of an equipotential plane shall not require bonding.

Informational Note No. 1: See ASEA/ASABE EP473.2-2001 (R2015), *Equipotential Planes in Animal Containment Areas*, for methods to establish equipotential planes.

Informational Note No. 2: See ASEA/ASABE EP342.3-2010 (R2015), *Safety for Electrically Heated Livestock Waterers*, for methods for safe installation of livestock waterers.

Informational Note No. 3: Low grounding electrode system resistances may reduce voltage differences in livestock facilities.

## Statement of Problem and Substantiation for Public Input

This PI simply seeks to relocate this requirement to Part II of the Article. Installing an equipotential plane is not a distribution issue. Alternatively, Part III could be renamed but I do not have any suggestions for that.

## Submitter Information Verification

**Submitter Full Name:** Ryan Jackson

**Organization:** Self-employed

**Street Address:**

**City:**

**State:**

**Zip:**

<b>Submittal Date:</b>	Mon Apr 17 12:03:02 EDT 2023
<b>Committee:</b>	NEC-P07

**Public Input No. 2076-NFPA 70-2023 [ Section No. 547.44(B) ]****(B) Bonding.**

Equipotential planes shall be bonded to the grounding electrode system or an equipment grounding terminal in any enclosed panelboard of the electrical grounding system associated with the equipotential plane. The bonding conductor shall be solid copper, insulated, covered or bare, and not smaller than 8 AWG. The means of bonding to wire mesh or conductive elements shall be by pressure connectors or clamps of brass, copper, copper alloy, or other approved means. Slatted floors that are supported by structures that are a part of an equipotential plane shall not require bonding.

**(C) Equipotential Plane Construction.**

The equipotential plane shall be constructed as specified in 547.44(C)(a) or (C)(b) .

(a) Structural Reinforcing Steel. Unencapsulated structural reinforcing steel bonded together by steel tie wires or the equivalent.

(b) Copper Grid. Copper grid where the following requirements are met:

(1) Be constructed of minimum 8 AWG bare solid copper conductors bonded to each other at all points of crossing in accordance with 250.8 or other approved means

(2) Be arranged in a 300 mm (12 in.) by 300 mm (12 in.) network of conductors in a uniformly spaced perpendicular grid pattern with a tolerance of 100 mm (4 in.)

Informational Note No. 1: See ASEA/ASABE EP473.2-2001 (R2015), *Equipotential Planes in Animal Containment Areas*, for methods to establish equipotential planes.

Informational Note No. 2: See ASEA/ASABE EP342.3-2010 (R2015), *Safety for Electrically Heated Livestock Waterers*, for methods for safe installation of livestock waterers.

Informational Note No. 3: Low grounding electrode system resistances may reduce voltage differences in livestock facilities.

**Statement of Problem and Substantiation for Public Input**

The term 'panelboard' and 'enclosed panelboard' are defined terms. Adding the word 'enclosed panelboard' makes the text technically correct. Note: The term 'Enclosed Panelboard' was added to NEC Article 100 during the 2023 Code cycle.

New text (C) from 680.26 provides the details on how the equipotential plane is to be constructed.

**Submitter Information Verification**

**Submitter Full Name:** Mike Holt

**Organization:** Mike Holt Enterprises Inc

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Aug 11 15:21:41 EDT 2023

**Committee:** NEC-P07





## Public Input No. 1776-NFPA 70-2023 [ Article 550 ]

### **Article 550** Mobile Homes, Manufactured Homes, and Mobile Home Parks

#### **Part I.** General

##### **550.1** Scope.

This article covers the electrical conductors and equipment installed within or on mobile and manufactured homes, the conductors that connect mobile and manufactured homes to a supply of electricity, and the installation of electrical wiring, luminaires, equipment, and appurtenances related to electrical installations within a mobile home park up to the mobile home service-entrance conductors or, if none, the mobile home service equipment.

Informational Note: See NFPA 501-2017, *Standard on Manufactured Housing*, and Part 3280, *Manufactured Home Construction and Safety Standards*, of the Federal Department of Housing and Urban Development for additional information on manufactured housing.

##### **550.2** Listed and Labeled.

All electrical materials, devices, appliances, fittings, and other equipment shall be listed and labeled by a qualified testing agency and installed according to the manufacturer's instructions.

##### **550.4** General Requirements.

###### **(A)** In Other Than Mobile Home Parks.

Mobile homes installed in other than mobile home parks shall comply with the provisions of this article.

###### **(B)** Connection to Wiring System.

This article shall apply to mobile homes intended for connection to a wiring system rated 120/240 volts, nominal, 3-wire ac, with a grounded neutral conductor.

###### ~~**(C)** Listed and Labeled.~~

~~All electrical materials, devices, appliances, fittings, and other equipment shall be listed and labeled by a qualified testing agency and shall be connected in an approved manner when installed.~~

#### ~~**Part II.** Mobile and Manufactured Homes~~

**550.10 Power Supply.****(A) Feeder.**

The power supply to the mobile home shall

be a feeder assembly consisting of not

consist of not more than one listed 50-ampere mobile home

power-supply cord

feeder assembly or a permanently installed feeder.

Exception No. 1: A mobile home that is factory equipped with gas or oil-fired central heating equipment and cooking appliances shall be permitted to be provided with a listed mobile home

power-supply cord

feeder assembly rated 40 amperes.

Exception No. 2: A feeder assembly shall not be required for manufactured homes constructed in accordance with 550.

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52 (B) .

**(B)**

**Power-Supply Cord**

**Feeder Assembly .**

If the mobile home has a

power-supply cord

feeder assembly , it shall be permanently attached to the panelboard, or to a junction box permanently connected to the panelboard, with the free end terminating in an attachment plug cap.

Cords with adapters and pigtail ends, extension cords, and similar items shall not be attached to, or shipped with, a mobile home.

A suitable clamp or the equivalent shall be provided at the panelboard knockout to afford strain relief for the cord to prevent strain from being transmitted to the terminals when the

power-supply cord

feeder assembly is handled in its intended manner.

The

cord

feeder assembly shall be a listed type with four conductors, one of which shall be identified by a continuous green color or a continuous green color with one or more yellow stripes for use as the equipment grounding conductor.

**(C)\_ Attachment Plug Cap.**

The attachment plug cap shall be a 3-pole, 4-wire, grounding type, rated 50 amperes, 125/250 volts with a configuration as shown in [Figure 550.10\(C\)](#) and intended for use with the 50-ampere, 125/250-volt receptacle configuration shown in [Figure 550.10\(C\)](#). It shall be listed, by itself or as part of a

power-supply cord

feeder 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 cap. If a right-angle cap is used, the configuration shall be oriented so that the grounding member is farthest from the cord.

Informational Note: See ANSI/NEMA WD 6-2016, *Wiring Devices — Dimensional Specifications*, Figure 14-50, for complete details of the 50-ampere plug and receptacle configuration.

**Figure 550.10(C) 50-Ampere, 125/250-Volt Receptacle and Attachment Plug Cap Configurations, 3-Pole, 4-Wire, Grounding-Types, Used for**

Mobile Home Supply Cords and

**Feeder Assemblies for a Mobile Home and Mobile Home Parks.****(D)\_ Overall Length of a**

Power-Supply Cord

**Feeder Assembly.**

The overall length of a power-supply cord, measured from the end of the cord, including bared leads, to the face of the attachment plug cap shall not be less than 6.4 m (21 ft) and shall not exceed 11 m (36  $\frac{1}{2}$  ft). The length of the cord from the face of the attachment plug cap to the point where the cord enters the mobile home shall not be less than 6.0 m (20 ft).

**(E)\_ Marking.**

The power-supply cord shall bear the following marking:

FOR USE WITH MOBILE HOMES — 40 AMPERES

or

FOR USE WITH MOBILE HOMES — 50 AMPERES

**(F)\_ Point of Entrance.**

The point of entrance of the feeder assembly to the mobile home shall be in the exterior wall, floor, or roof.

**(G)\_ Protected.**

Where the cord passes through walls or floors, it shall be protected by means of conduits and bushings or equivalent. The cord shall be permitted to be installed within the mobile home walls, provided a continuous raceway having a maximum size of 32 mm (1 <sup>1</sup>/<sub>4</sub> in.) is installed from the branch-circuit panelboard to the underside of the mobile home floor.

**(H)\_ Protection Against Corrosion and Mechanical Damage.**

Permanent provisions shall be made for the protection of the attachment plug cap of the power-supply cord

feeder assembly and any connector cord assembly or receptacle against corrosion and mechanical damage if such devices are in an exterior location while the mobile home is in transit.

**(I)\_ Mast Weatherhead or Raceway.**

Where the calculated load exceeds 50 amperes or where a permanent feeder is used, the supply shall be by means of either of the following:

- (1) One mast weatherhead installation, installed in accordance with

**Part II of**

- (1) Article 230, Part II, containing four continuous, insulated, color-coded feeder conductors, one of which shall be an equipment grounding conductor
- (2) A rigid metal conduit, intermediate metal conduit, rigid polyvinyl chloride conduit, or other raceways identified for the location, from the disconnecting means in the mobile home to the underside of the mobile home, with provisions for the attachment to a suitable junction box or fitting to the raceway on the underside of the mobile home [with or without conductors as in 550.10(I)(1)]. The manufacturer shall provide written installation instructions stating the proper feeder conductor sizes for the raceway and the size of the junction box to be used.

**550.11 Disconnecting Means and Branch-Circuit Protective Equipment.**

The branch-circuit equipment shall be permitted to be combined with the disconnecting means as a single assembly. Such a combination shall be permitted to be designated as a panelboard. If a fused panelboard is used, the maximum fuse size for the mains shall be plainly marked with lettering at least 6 mm ( <sup>1</sup>/<sub>4</sub> in.) high and visible when fuses are changed.

Where plug fuses and fuseholders are used, they shall be tamper-resistant Type S, enclosed in dead-front fuse panelboards. Electrical panelboards containing circuit breakers shall also be dead-front type.

Informational Note: See 110.22

concerning

for identification of each disconnecting means and each service, feeder, or branch circuit at the point where it originated and the type marking needed.

**(A) Disconnecting Means.**

A single disconnecting means shall be provided in each mobile home consisting of a circuit breaker, or a switch and fuses and its accessories installed in a readily accessible location near the point of entrance of the

supply cord or

feeder assembly or conductors into the mobile home. The main circuit breakers or fuses shall be plainly marked "Main." This equipment shall contain a solderless type of grounding connector or bar for the purposes of grounding, with sufficient terminals for all grounding conductors. The terminations of the grounded circuit conductors shall be insulated in accordance with 550.

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18 (A) . The disconnecting equipment shall have a rating not less than the calculated load. The distribution equipment, either circuit breaker or fused type, shall be located a minimum of 600 mm (24 in.) from the bottom of such equipment to the floor level of the mobile home.

Informational Note: See 550.

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A ) for information on disconnecting means

for branch

of branch circuits designed to energize heating or air-conditioning equipment, or both, located outside the mobile home, other than room air conditioners.

A panelboard shall be rated not less than 50 amperes and employ a 2-pole circuit breaker rated 40 amperes for a 40-ampere

supply cord

feeder assembly , or 50 amperes for a 50-ampere

supply cord

feeder assembly . A panelboard employing a disconnect switch and fuses shall be rated 60 amperes and shall employ a single 2-pole, 60-ampere fuseholder with 40- or 50-ampere main fuses for 40- or 50-ampere

supply cords

feeder assembly , respectively. The outside of the panelboard shall be plainly marked with the fuse size.

The panelboard shall be located in an accessible location but shall not be located in a bathroom or a clothes closet. A clear working space at least 750 mm (30 in.) wide and 750 mm (30 in.) in front of the panelboard shall be provided. This space shall extend from the floor to the top of the panelboard.

**(B) Branch-Circuit Protective Equipment.**

Branch-circuit distribution equipment shall be installed in each mobile home and shall include overcurrent protection for each branch circuit consisting of either circuit breakers or fuses.

The branch-circuit overcurrent devices shall be rated as follows:

- (1) \_ Not more than the circuit conductors; and
- (2) \_ Not more than 150 percent of the rating of a single appliance rated 13.3 amperes or more that is supplied by an individual branch circuit; but
- (3) \_ Not more than the overcurrent protection size and of the type marked on the air conditioner or other motor-operated appliance.

**(C) Two-Pole Circuit Breakers.**

Where circuit breakers are provided for branch-circuit protection, 240-volt circuits shall be protected by a 2-pole common or companion trip, or by circuit breakers with identified handle ties.

**(D) Electrical Nameplates.**

A metal nameplate on the outside adjacent to the feeder assembly entrance shall read as follows:

THIS CONNECTION FOR 120/240-VOLT,

3-POLE, 4-WIRE, 60-HERTZ,

      AMPERE SUPPLY

The correct ampere rating shall be marked in the blank space.

*Exception: For manufactured homes, the manufacturer shall provide in its written installation instructions or in the data plate the minimum ampere rating of the feeder assembly or, where provided, the service-entrance conductors intended for connection to the manufactured home. The rating provided shall not be less than the minimum load calculated in accordance with 550.*

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**550.12 Branch Circuits.**

The number of branch circuits required shall be determined in accordance with 550.12(A) through (E).

**(A) Lighting.**

The number of branch circuits shall be based on  $33 \text{ volt-amperes/m}^2$  ( $3 \text{ VA/ft}^2$ ) times outside dimensions of the mobile home (coupler excluded) divided by 120 volts to determine the number of 15- or 20-ampere lighting area circuits, for example,



**[550.12(A)]**

**(B) Small Appliances.**

In kitchens, pantries, dining rooms, and breakfast rooms, two or more 20-ampere small-appliance circuits, in addition to the number of circuits required elsewhere in this section, shall be provided for all receptacle outlets required by 550.13(

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F ) in these rooms.

Such circuits

The small appliance circuits shall have no other outlets.

Exception No. 1: Receptacle outlets installed solely for the electrical supply and support of an electric clock in any the rooms specified in 550.12(B) shall be permitted.

Exception No. 2: Receptacle outlets installed to provide

power for supplemental equipment and lighting on

power on gas-fired ranges, ovens, or counter-mounted cooking units shall be permitted.

Exception No. 3: A single receptacle for refrigeration equipment shall be permitted to be supplied from an individual branch circuit rated 15 amperes or greater.

Countertop receptacle outlets installed in the kitchen shall be supplied by not less than two small-appliance circuit branch circuits, either or both of which shall be permitted to supply receptacle outlets in the kitchen and other locations specified in 550.12(B) .

**(C) Laundry Area.**

Where a laundry area is provided, a 20-ampere branch circuit shall be provided to supply the laundry receptacle outlet(s). This circuit shall have no other outlets.

**(D) General Appliances.**

(Including furnace, water heater, range, and central or room air conditioner, etc.). There shall be one or more circuits of adequate rating in accordance with the following:

Informational Note: See Article 440 , Parts I through VII for central air conditioning.

- (1) The ampere rating of fixed appliances shall be not over 50 percent of the circuit rating if lighting outlets (receptacles, other than kitchen, dining area, and laundry, considered as lighting outlets) are on the same circuit.
- (2) For fixed appliances on a circuit without lighting outlets, the sum of rated amperes shall not exceed the branch-circuit rating. Motor loads or continuous loads shall not exceed 80 percent of the branch-circuit rating.
- (3) The rating of a single cord-and-plug-connected appliance on a circuit having no other outlets shall not exceed 80 percent of the circuit rating.
- (4) The rating of a range branch circuit shall be based on the range demand as specified for ranges in 550.

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- (1) 30 (B)(5) .

**(E) Bathrooms.**

Bathroom receptacle outlets shall be supplied by at least one 20-ampere branch circuit. Such circuits shall have no outlets other than as provided for in 550.13(

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G )(2) .

**550.13 Receptacle Outlets.**



**(A) Grounding-Type Receptacle Outlets.**

All receptacle outlets shall comply with the following:

- (1) Be of grounding type
- (2) Be installed according to 406.4
- (3) Except where supplying specific appliances, be 15- or 20-ampere, 125-volt, either single or multiple type, and accept parallel-blade attachment plugs

**(B) Ground-Fault Circuit Interrupters (GFCI).**

Ground-fault circuit interrupter

GFCI protection shall be provided as required in 210.8(A). In addition, in the following areas within a mobile or manufactured home, GFCI protection is limited to 125-volt, 15- and 20-ampere receptacles or outlets:

- (1) Compartment accessible from outside the unit
- (2) Bathrooms, including receptacles in luminaires
- (3) Kitchens, where receptacles are installed to serve countertop surfaces
- (4) Sinks, where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the sink
- (5) Dishwashers

Informational Note: See 422.5 (A) for information on protection of dishwashers.

~~(C)~~

**(C) Arc-Fault Circuit-Interrupter Protection.**

**All 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets or devices installed in mobile homes and manufactured homes shall comply with 210.12.**

**(D) Outdoor Receptacles.**

Outdoor receptacle outlets shall comply with 406.9.

**(E) Cord-Connected Fixed Appliance.**

A grounding-type receptacle outlet shall be provided for each cord-connected fixed appliance installed.

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**F) Receptacle Outlets Required.**

Except in the

bath

bathroom, closet, and hallway areas, receptacle outlets shall be installed at wall spaces 600 mm (2 ft) wide or more so that no point along the floor line is more than 1.8 m (6 ft) measured horizontally from an outlet in that space. In addition, a receptacle outlet shall be installed in the following locations:

- (1) Over or adjacent to countertops in the kitchen [at least one on each side of the sink if countertops are on each side and are 300 mm (12 in.) or over in width].
- (2) Adjacent to the refrigerator and freestanding gas-range space. A multiple-type receptacle shall be permitted to serve as the outlet for a countertop and a refrigerator.
- (3) At countertop spaces for built-in vanities.
- (4) At countertop spaces under wall-mounted cabinets.
- (5) In the wall at the nearest point to where a bar-type counter attaches to the wall.
- (6) In the wall at the nearest point to where a fixed room divider attaches to the wall.
- (7) In laundry areas within 1.8 m (6 ft) of the intended location of the laundry appliance(s).
- (8) At least one receptacle outlet located outdoors and accessible at grade level and not more than 2.0 m (6  $\frac{1}{2}$  ft) above grade. A receptacle outlet located in a compartment accessible from the outside of the unit shall be considered an outdoor receptacle.
- (9) At least one receptacle outlet shall be installed in bathrooms within 900 mm (36 in.) of the outside edge of each basin. The receptacle outlet shall be located above or adjacent to the basin location. This receptacle shall be in addition to any receptacle that is a part of a luminaire or appliance. The receptacle shall not be enclosed within a bathroom cabinet or vanity.

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**G )\_ Pipe Heating Cable(s) Receptacle Outlet.**

For the connection of pipe heating cable(s), a receptacle outlet shall be located on the underside of the unit as follows:

- (1) \_ Within 600 mm (2 ft) of the cold water inlet.
- (2) \_ Connected to an interior branch circuit, other than a small-appliance branch circuit. It shall be permitted to use a bathroom receptacle circuit for this purpose.
- (3) On a circuit where all of the outlets are on the load side of the

ground-fault circuit interrupter

- (1) GFCI .
- (2) This outlet shall not be considered as the receptacle required by 550.13(

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- (1) E )(8) .

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**H )\_ Receptacle Outlets Not Permitted.**

Receptacle outlets shall not be permitted in the following locations:

- (1) \_ Receptacle outlets shall not be installed within or directly over a bathtub or shower space.
- (2) \_ A receptacle shall not be installed in a face-up position in any countertop.
- (3) \_ Receptacle outlets shall not be installed above electric baseboard heaters, unless provided for in the listing or manufacturer's instructions.

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**I )\_ Receptacle Outlets Not Required.**

Receptacle outlets shall not be required in the following locations:

- (1) \_ In the wall space occupied by built-in kitchen or wardrobe cabinets
- (2) \_ In the wall space behind doors that can be opened fully against a wall surface
- (3) \_ In room dividers of the lattice type that are less than 2.5 m (8 ft) long, not solid, and within 150 mm (6 in.) of the floor
- (4) \_ In the wall space afforded by bar-type counters

**550.14**

Luminaires and

**Appliances.****(A)\_ Fasten Appliances in Transit.**

Means shall be provided to securely fasten appliances when the mobile home is in transit.

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Informational Note: See 550.

~~16 for~~

18 for provisions on grounding.

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**(B)\_ Accessibility.**

Every appliance shall be accessible for inspection, service, repair, or replacement without removal of permanent construction.

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**550.15 Luminaires.****(A )\_ Pendants.**

Listed pendant-type luminaires or pendant cords shall be permitted.

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**B )\_ Bathtub and Shower Luminaires.**

Where a luminaire is installed over a bathtub or in a shower stall, it shall be of the enclosed and gasketed type listed for wet locations.

~~550.15-~~

**(C) Exterior Mounted Luminaires.**

Outdoor luminaires shall be listed for wet locations or outdoor use. Outdoor luminaires located on the underside of the home, under roof extensions or similarly protected locations, shall be listed for use in damp locations.

**550.16 Equipment**

Outdoor electrical equipment shall be listed for wet locations or outdoor use. Outdoor electrical equipment located on the underside of the home, under roof extensions or similarly protected locations, shall be listed for use in damp locations.

**550.16(A) Outside Heating and Air-Conditioning Equipment.**

A mobile home provided with a branch circuit designed to energize outside heating equipment, air-conditioning equipment, or both, located outside the mobile home, other than room air conditioners, shall have such branch-circuit conductors terminate in a listed outlet box, or disconnecting means, located on the outside of the mobile home. A label shall be permanently affixed adjacent to the outlet box and shall contain the following information:

THIS CONNECTION IS FOR HEATING

AND/OR AIR-CONDITIONING EQUIPMENT.

THE BRANCH CIRCUIT IS RATED AT NOT MORE THAN

\_\_\_\_\_ AMPERES, AT \_\_\_\_\_ VOLTS, 60 HERTZ,

\_\_\_\_\_ CONDUCTOR AMPACITY.

A DISCONNECTING MEANS SHALL BE LOCATED

WITHIN SIGHT OF THE EQUIPMENT.

The correct voltage and ampere rating shall be given. The tag shall be not less than 0.51 mm (0.020 in.) thick etched brass, stainless steel, anodized or alclad aluminum, or equivalent.

The tag shall not be less than 75 mm by 45 mm (3 in. by 1 <sup>3</sup>/<sub>4</sub> in.) minimum size.

**550.17 Wiring Methods and Materials.**

Except as specifically limited in this section, the wiring methods and materials included in this Code shall be used in mobile homes. Where conductors are terminated, they shall be used with equipment listed and identified for the conductor materials.

**(A) Nonmetallic Boxes.**

Nonmetallic boxes shall be permitted only with nonmetallic cable or nonmetallic raceways.

**(B) Nonmetallic Cable Protection.**

Nonmetallic cable located 380 mm (15 in.) or less above the floor, if exposed, shall be protected from physical damage by covering boards, guard strips, or raceways. Cable likely to be damaged by stowage shall be so protected in all cases.

**(C) Metal-Covered and Nonmetallic Cable Protection.**

Metal-covered and nonmetallic cables shall be permitted to pass through the centers of the wide side of 2 by 4 studs. However, they shall be protected where they pass through 2 by 2 studs or at other studs or frames where the cable or armor would be less than 32 mm (1 1/4 in.) from the inside or outside surface of the studs where the wall covering materials are in contact with the studs. Steel plates on each side of the cable, or a tube, with not less than 1.35 mm (0.053 in.) wall thickness shall be required to protect the cable. These plates or tubes shall be securely held in place.

**(D) Metal Faceplates.**

Where metal faceplates are used, the installation shall comply with 404.9(B) and 406.6(B) .

**(E) Installation Requirements.**

Where a range, clothes dryer, or other appliance is connected by metal-covered cable or flexible metal conduit, a length of not less than 900 mm (3 ft) of unsupported cable or conduit shall be provided to service the appliance. The cable or flexible metal conduit shall be secured to the wall. Type NM or Type SE cable shall not be used to connect a range or dryer. This shall not prohibit the use of Type NM or Type SE cable between the branch-circuit overcurrent protective device and a junction box or range or dryer receptacle.

**(F) Raceways.**

Where rigid metal conduit or intermediate metal conduit is terminated at an enclosure with a locknut and bushing connection, two locknuts shall be provided, one inside and one outside of the enclosure. Rigid nonmetallic conduit, electrical nonmetallic tubing, or surface raceway shall be permitted. All cut ends of conduit and tubing shall be reamed or otherwise finished to remove rough edges.

**(G) Switches.**

Switches shall be rated as follows:

- (1) For lighting circuits, switches shall be rated not less than 10 amperes, 120 to 125 volts, and in no case less than the connected load.
- (2) Switches for motor or other loads shall comply with 404.14 .

**(H) Under-Chassis Wiring (Exposed to Weather).**

**(1)**

Where outdoor or under-chassis line-voltage (120 volts, nominal, or higher) wiring is exposed, it shall be protected by a conduit or raceway identified for use in wet locations. The conductors shall be listed for use in wet locations.

**(2)**

Where wiring is exposed to physical damage, it shall be protected by a raceway, conduit, or other means.

**(I) Boxes, Fittings, and Cabinets.**

Boxes, fittings, and cabinets shall be securely fastened in place and shall be supported from a structural member of the home, either directly or by using a substantial brace.

*Exception: Snap-in-type boxes. Boxes provided with special wall or ceiling brackets and wiring devices with integral enclosures that securely fasten to walls or ceilings and are identified for the use shall be permitted without support from a structural member or brace. The testing and approval shall include the wall and ceiling construction systems for which the boxes and devices are intended to be used.*

**(J) Appliance Terminal Connections.**

Appliances having branch-circuit terminal connections that operate at temperatures higher than 60°C (140°F) shall have circuit conductors as described in the following:

- (1) Branch-circuit conductors having an insulation suitable for the temperature encountered shall be permitted to be run directly to the appliance.
- (2) Conductors having an insulation suitable for the temperature encountered shall be run from the appliance terminal connection to a readily accessible outlet box placed at least 300 mm (1 ft) from the appliance. These conductors shall be in a suitable raceway or Type AC or MC cable of at least 450 mm (18 in.) but not more than 1.8 m (6 ft) in length.

**(K) Component Interconnections.**

Fittings and connectors that are intended to be concealed at the time of assembly shall be listed and identified for the interconnection of building components. Such fittings and connectors shall be equal to the wiring method employed in insulation, temperature rise, and fault-current withstanding and shall be capable of enduring the vibration and shock occurring in mobile home transportation.

Informational Note: See 550.

19 for

1 for interconnection of multiple section units.

**550.**

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**18 Grounding.**

Grounding of both electrical and nonelectrical metal parts in a mobile home shall be through connection to a grounding bus in the mobile home panelboard and shall be connected through the green-colored insulated conductor in the

supply cord

feeder assembly or the feeder wiring to the grounding bus in the service-entrance equipment located adjacent to the mobile home location. Neither the frame of the mobile home nor the frame of any appliance shall be connected to the grounded circuit conductor in the mobile home. Where the panelboard is the service equipment as permitted by 550.

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52 (B) , the neutral conductors and the equipment grounding bus shall be connected.

(A)\_ Grounded Conductor.

(1)\_ Insulated.

The grounded circuit conductor shall be insulated from the equipment grounding conductors and from equipment enclosures and other grounded parts. The grounded circuit conductor terminals in the panelboard and in ranges, clothes dryers, counter-mounted cooking units, and wall-mounted ovens shall be insulated from the equipment enclosure. Bonding screws, straps, or buses in the panelboard or in appliances shall be removed and discarded. Where the panelboard is the service equipment as permitted by 550.

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52 (B) , the neutral conductors and the equipment grounding bus shall be connected.

(2)\_ Connections of Ranges and Clothes Dryers.

Connections of ranges and clothes dryers with 120/240-volt, 3-wire ratings shall be made with 4-conductor cord and 3-pole, 4-wire, grounding-type plugs or by Type AC cable, Type MC cable, or conductors enclosed in flexible metal conduit.

(B)\_ Equipment Grounding Means.

(1)\_

Supply Cord

**Feeder Assembly or Permanent Feeder.**

The green-colored insulated grounding wire in the supply cord

feeder assembly or permanent feeder wiring shall be connected to the grounding bus in the panelboard or disconnecting means.

**(2) Electrical System.**

In the electrical system, all exposed metal parts, enclosures, frames, luminaire canopies, and so forth, shall be effectively bonded to the grounding terminal or enclosure of the panelboard.

**(3) Cord-Connected Appliances.**

Cord-connected appliances, such as washing machines, clothes dryers, and refrigerators, and the electrical system of gas ranges and so forth, shall be grounded by means of a cord with an equipment grounding conductor and grounding-type attachment plug.

**(C) Bonding of Non-Current-Carrying Metal Parts.****(1) Exposed Non-Current-Carrying Metal Parts.**

All exposed non-current-carrying metal parts that are likely to become energized shall be effectively bonded to the grounding terminal or enclosure of the panelboard. A bonding conductor shall be connected between the panelboard and an accessible terminal on the chassis. Chassis of multiple mobile home sections shall be bonded together with a solid copper, 8 AWG minimum, insulated or bare, bonding conductor with terminations in accordance with 250.8 and 250.12 .

**(2) Grounding Terminals.**

Grounding terminals shall be of the solderless type and listed as pressure-terminal connectors recognized for the wire size used. The bonding conductor shall be solid or stranded, insulated or bare, and shall be 8 AWG copper minimum, or equivalent. The bonding conductor shall be routed so as not to be exposed to physical damage.

**(3) Metallic Piping and Ducts.**

Metallic gas, water, and waste pipes and metallic air-circulating ducts shall be considered bonded if they are connected to the terminal on the chassis [see 550.

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18 (C)(1) ] by clamps, solderless connectors, or by suitable grounding-type straps.

**(4) Metallic Roof and Exterior Coverings.**

Any metallic roof and exterior covering shall be considered bonded if the following conditions are met:

- (1) The metal panels overlap one another and are securely attached to the wood or metal frame parts by metallic fasteners.
- (2) The lower panel of the metallic exterior covering is secured by metallic fasteners at a cross member of the chassis by two metal straps per mobile home unit or section at opposite ends.

The bonding strap material shall be a minimum of 100 mm (4 in.) in width of material equivalent to the skin or a material of equal or better electrical conductivity. The straps shall be fastened with paint-penetrating fittings such as screws and starwashers or equivalent.

**550.**

17—

**19** Testing.**(A)** Dielectric Strength Test.

The wiring of each mobile home shall be subjected to a 1-minute, 900-volt, dielectric strength test (with all switches closed) between live parts (including neutral conductor) and the mobile home ground. Alternatively, the test shall be permitted to be performed at 1080 volts for 1 second. This test shall be performed after branch circuits are complete and after luminaires or appliances are installed.

*Exception: Listed luminaires or appliances shall not be required to withstand the dielectric strength test.*

**(B)** Continuity and Operational Tests and Polarity Checks.

Each mobile home shall be subjected to all of the following:

- (1) An electrical continuity test to ensure that all exposed electrically conductive parts are properly bonded
- (2) An electrical operational test to demonstrate that all equipment, except water heaters and electric furnaces, is connected and in working order
- (3) Electrical polarity checks of permanently wired equipment and receptacle outlets to determine that connections have been properly made

**Part III Calculations****550.**

18—

**20** Calculations.

The following method shall be employed in calculating the  
supply-cord

feeder assembly and distribution-panelboard load for each feeder assembly for each mobile home in lieu of the procedure shown in Article 220 and shall be based on a 3-wire, 120/240-volt supply with 120-volt loads balanced between the two ungrounded conductors of the 3-wire system.

**(A) Lighting, Small-Appliance, and Laundry Load.**

**(1) Lighting Volt-Amperes.**

Length times width of mobile home floor (outside dimensions) times 33 volt-amperes/m<sup>2</sup> (3 VA/ft<sup>2</sup>)— for example, length × width × 3 = lighting volt-amperes.

**(2) Small-Appliance Volt-Amperes.**

Number of circuits times 1500 volt-amperes for each 20-ampere appliance receptacle circuit — for example, number of circuits × 1500 = small-appliance volt-amperes.

**(3) Laundry Area Circuit Volt-Amperes.**

1500 volt-amperes.

**(4) Total Volt-Amperes.**

Lighting volt-amperes plus small-appliance volt-amperes plus laundry area volt-amperes equals total volt-amperes.

**(5) Net Volt-Amperes.**

First 3000 total volt-amperes at 100 percent plus remainder at 35 percent equals volt-amperes to be divided by 240 volts to obtain current (amperes) per

leg

phase .

**(B) Total Load for Determining Power Supply.**

Total load for determining power supply is the sum of the following:

**(1) Lighting and small-appliance load as calculated in 550.**

48

**(1) 30 (A)(5) .**

**(2) Nameplate amperes for motors and heater loads (exhaust fans, air conditioners, electric, gas, or oil heating). Omit smaller of the heating and cooling loads, except include blower motor if used as air-conditioner evaporator motor. Where an air conditioner is not installed and a 40-ampere**

power-supply cord

**(1) feeder assembly is provided, allow 15 amperes per**

leg for

**(1) phase for air conditioning.**

**(2) Twenty-five percent of current of largest motor in 550.**

48

**(1) 30 (B)(2) .**

**(2) Total of nameplate amperes for waste disposer, dishwasher, water heater, clothes dryer, wall-mounted oven, cooking units. Where the number of these appliances exceeds three, use 75 percent of total.**

**(3) Derive amperes for freestanding range (as distinguished from separate ovens and cooking units) by dividing the following values by 240 volts as shown in Table 550.**

18

(1) 30 (B) .(2) If outlets or circuits are provided for other than factory-installed appliances, include the anticipated load.

Informational Note: See Informative Annex D, Example D11, for an illustration of the application of this calculation.

Table 550.

18

**30 (B) Freestanding Range Load**

<u>Nameplate Rating</u>	<u>Use</u>
<u>(watts)</u>	<u>(volt-amperes)</u>
<u>0–10,000</u>	<u>80 percent of rating</u>
<u>Over 10,000–12,500</u>	<u>8,000</u>
<u>Over 12,500–13,500</u>	<u>8,400</u>
<u>Over 13,500–14,500</u>	<u>8,800</u>
<u>Over 14,500–15,500</u>	<u>9,200</u>
<u>Over 15,500–16,500</u>	<u>9,600</u>
<u>Over 16,500–17,500</u>	<u>10,000</u>

**(C) Optional Method of Calculation for Lighting and Appliance Load.**

The optional method for calculating lighting and appliance load shown in 220.82 shall be permitted.

**Part IV Interconnected Sections of Mobile or Manufactured Home Units.****550.**~~19 Part III~~**21 Interconnection of Multiple-Section Mobile or Manufactured Home Units.****(A) Wiring Methods.**

Approved and listed fixed-type wiring methods shall be used to join portions of a circuit that must be electrically joined and are located in adjacent sections after the home is installed on its support foundation. The circuit's junction shall be accessible for disassembly when the home is prepared for relocation.

Informational Note: See 550.

15

17 (K) for component interconnections.**(B) Disconnecting Means.**

Expandable or multiunit manufactured homes, not having permanently installed feeders, that are to be moved from one location to another shall be permitted to have disconnecting means with branch-circuit protective equipment in each unit when so located that after assembly or joining together of units, the requirements of 550.10 will be met.

**550.20 Outdoor Outlets, Luminaires, Air-Cooling Equipment, and So Forth.**

~~(A) Listed for Outdoor Use.~~

~~Outdoor luminaires and equipment shall be listed for wet locations or outdoor use. Outdoor receptacles shall comply with 406.9. Where located on the underside of the home or located under roof extensions or similarly protected locations, outdoor luminaires and equipment shall be listed for use in damp locations.~~

~~(B) Outside Heating Equipment, Air-Conditioning Equipment, or Both.~~

~~A mobile home provided with a branch circuit designed to energize outside heating equipment, air-conditioning equipment, or both, located outside the mobile home, other than room air conditioners, shall have such branch-circuit conductors terminate in a listed outlet box, or disconnecting means, located on the outside of the mobile home. A label shall be permanently affixed adjacent to the outlet box and shall contain the following information:~~

~~THIS CONNECTION IS FOR HEATING~~

~~AND/OR AIR-CONDITIONING EQUIPMENT.~~

~~THE BRANCH CIRCUIT IS RATED AT NOT MORE THAN~~

~~\_\_\_\_\_ AMPERES, AT \_\_\_\_\_ VOLTS, 60 HERTZ,~~

~~\_\_\_\_\_ CONDUCTOR AMPACITY.~~

~~A DISCONNECTING MEANS SHALL BE LOCATED~~

~~WITHIN SIGHT OF THE EQUIPMENT.~~

~~The correct voltage and ampere rating shall be given. The tag shall be not less than 0.51 mm (0.020 in.) thick etched brass, stainless steel, anodized or alclad aluminum, or equivalent. The tag shall not be less than 75 mm by 45 mm (3 in. by 1 3/4 in.) minimum size.~~

~~**550.25** Arc-Fault Circuit Interrupter Protection.~~

~~All 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets or devices installed in mobile homes and manufactured homes shall comply with 210.12~~

**Part IV . Services and Feeders****550.**

30—

**50 Distribution System.**

The mobile home park secondary electrical distribution system to mobile home lots shall be single-phase, 120/240 volts, nominal.

**550.**

31—

**51 Allowable Demand Factors.**

Park electrical wiring systems shall be calculated (at 120/240 volts) on the larger of the following:

- (1) 16,000 volt-amperes for each mobile home lot
- (2) The load calculated in accordance with 550.18 for the largest typical mobile home that each lot will accept

It shall be permissible to calculate the feeder or service load in accordance with Table 550.

31—

51 . No demand factor shall be allowed for any other load, except as provided in this Code .  
Table 550.

31 Demand

**51 Demand Factors for Services and Feeders**

<u>Number of</u>	<u>Demand</u>
<u>Mobile Homes</u>	<u>Factor (%)</u>
<u>1</u>	<u>100</u>
<u>2</u>	<u>55</u>
<u>3</u>	<u>44</u>
<u>4</u>	<u>39</u>
<u>5</u>	<u>33</u>
<u>6</u>	<u>29</u>
<u>7-9</u>	<u>28</u>
<u>10-12</u>	<u>27</u>
<u>13-15</u>	<u>26</u>
<u>16-21</u>	<u>25</u>
<u>22-40</u>	<u>24</u>
<u>41-60</u>	<u>23</u>
<u>61 and over</u>	<u>22</u>

**550.**

32—



**52 Service Equipment.****(A) Mobile Home Service Equipment.**

The mobile home service equipment shall not be mounted in or on the mobile home. The service equipment shall be rated not less than that required in accordance with 550.

32

52 (C) , mounted in a readily accessible outdoor location, and within sight from the mobile home it serves. The mobile home service disconnect shall be permitted to be used as the emergency disconnect in accordance with 230.85 .

**(B) Manufactured Home Service Equipment.**

The manufactured home service equipment shall be permitted to be installed in or on a manufactured home, provided that all of the following conditions are met:

- (1) The manufacturer shall include in its written installation instructions information indicating that the home shall be secured in place by an anchoring system or installed on and secured to a permanent foundation.
- (2) The installation of the service shall comply with Article 230, Part I through Part VII

of Article 230

- (1) .
- (2) Means shall be provided for the connection of a grounding electrode conductor to the service equipment and routing it outside the structure.
- (3) Bonding and grounding of the service shall be in accordance with Article 250, Part I through Part V

of Article 250

- (1) .
- (2) The manufacturer shall include in its written installation instructions one method of grounding the service equipment at the installation site. The instructions shall clearly state that other methods of grounding are found in Article 250 , Part I through V .
- (3) The minimum size grounding electrode conductor shall be specified in the instructions.
- (4) A warning label shall be mounted on or adjacent to the service equipment. The label shall meet the requirements in 110.21(B) and shall state the following:

WARNING

DO NOT PROVIDE ELECTRICAL POWER

UNTIL THE GROUNDING ELECTRODE(S)

IS INSTALLED AND CONNECTED

(SEE INSTALLATION INSTRUCTIONS).

Where the service equipment is not installed in or on the unit, the installation shall comply with the other requirements of this section.

(C) Rating.

Mobile home service equipment shall be rated at not less than 100 amperes at 120/240 volts, and provisions shall be made for connecting a mobile home feeder assembly by a permanent wiring method. Power outlets used as mobile home service equipment shall also be permitted to contain receptacles rated up to 50 amperes with appropriate overcurrent protection. Fifty-ampere receptacles shall conform to the configuration shown in Figure 550.10(C) .

Informational Note: See ANSI/NEMA WD 6-2016, *Wiring Devices — Dimensional Specifications*, Figure 14-50, for complete details of the 50-ampere plug and receptacle configuration.

(D) Additional Outside Electrical Equipment.

Means for connecting a mobile home accessory building or structure or additional electrical equipment located outside a mobile home by a fixed wiring method shall be provided in either the mobile home service equipment or the local external disconnecting means permitted in 550.32(A) .

**(E)\_ Additional Receptacles.**

Receptacles located outside a mobile or manufactured home shall be provided with ground-fault circuit-interrupter protection as specified by 210.8(A) . Where receptacles provide power to a mobile or manufactured home in accordance with 550.10 , ground-fault circuit-interrupter protection shall not be required.

**(F)\_ Mounting Height.**

Outdoor mobile home disconnecting means shall be installed so the bottom of the enclosure containing the disconnecting means is not less than 600 mm (2 ft) above finished grade or working platform. The disconnecting means shall be installed so that the center of the grip of the operating handle, when in the highest position, is not more than 2.0 m (6 ft 7 in.) above the finished grade or working platform.

**(G)\_ Marking.**

Where a 125/250-volt receptacle is used in mobile home service equipment, the service equipment shall be marked as follows:

TURN DISCONNECTING SWITCH OR

CIRCUIT BREAKER OFF BEFORE INSERTING

OR REMOVING PLUG. PLUG MUST BE FULLY

INSERTED OR REMOVED.

The marking shall be located on the service equipment adjacent to the receptacle outlet.

**550.**

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**53** Feeder.**(A)** Feeder Equipment.

The feeder assembly, including the disconnecting means, shall not be mounted in or on the mobile home. A manufactured home feeder disconnecting means shall be permitted to be installed in or on the manufactured home in accordance with the requirements of 550.

32

52 (B) . The feeder equipment shall be rated not less than that required in 550.

32

52 (C) , mounted in a readily accessible outdoor location, and within sight from the mobile home or manufactured home it serves. Grounding of the disconnecting means shall be in accordance with 250.32 .

**(B)** Feeder Conductors.

Feeder conductors shall comply with the following:

- (1) Feeder conductors shall consist of either a listed cord, factory installed in accordance with 550.10(B) , or a permanently installed feeder consisting of four insulated, color-coded conductors that shall be identified by the factory or field marking of the conductors in compliance with 310.6 . Equipment grounding conductors shall not be identified by stripping the insulation.
- (2) Feeder conductors shall be installed in compliance with 250.32(B) .

*Exception: An existing feeder installed without an equipment grounding conductor shall be permitted to comply with 250.32(B)(1) . Exception No. 1.*

**(C)** Feeder Capacity.

Mobile home and manufactured home feeder circuit conductors shall have a capacity not less than the loads supplied, shall have an ampacity of not less than 100 amperes, and shall be permitted to be sized in accordance with 310.12 .

## Statement of Problem and Substantiation for Public Input

Article 550 was rewritten for clarity and usability. Added "Parts" for to separate requirements, relocated and renumbered sections for usability. Changed the term "power-supply cord" to "feeder assembly" to be consistent with the new definition. In addition, there were a few NEC Style Manual issues that were revised.

- 2.2.1 Parallel Numbering Required. Moved the listing requirements to the .2 section
- If possible, lists or tables to present requirements shall be used, rather than long text descriptions. and
- 3.2.4 Standard Terms. Standard terms have been established through accepted use or by definition and shall be used in preference to similar terms that do not have such recognition.
- 4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context.

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<b>Submittal Date:</b>	Tue Aug 01 15:55:24 EDT 2023
<b>Committee:</b>	NEC-P07



## Public Input No. 2798-NFPA 70-2023 [ New Section after 550.1 ]

### 550.2 Listing Requirements

All electrical materials, devices, appliances, fittings, and other equipment shall be listed and labeled by a qualified testing agency and shall be connected in an approved manner when installed.

## Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document when general listing requirements are covered within an article. The NEC Style Manual Section 2.2.1 Parallel Numbering Required, states that technical committees shall use the following section numbers for the same purposes within articles.

The listing requirements are to be located in the .2 section.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 2797-NFPA 70-2023 [Section No. 550.4]</u>	Deleted and relocated to the .2 section.
<u>Public Input No. 2797-NFPA 70-2023 [Section No. 550.4]</u>	

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**Submittal Date:** Fri Aug 25 11:22:16 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1767-NFPA 70-2023 [ Section No. 550.1 ]

### 550.1 Scope.

This article covers the electrical conductors and equipment installed within or on mobile and manufactured homes, the conductors that connect mobile and manufactured homes to a supply of electricity, and the installation of electrical wiring, luminaires, equipment, and appurtenances related to electrical installations within a mobile home park up to the mobile home service-entrance conductors or, if none, the mobile home service equipment.

Informational Note: See NFPA 501-2017, ~~Standard on Manufactured Housing~~, and Part 3280, ~~Manufactured~~ 24 CFR Part 3280, Manufactured Home Construction and Safety Standards, of the Federal Department of Housing and Urban Development for additional information on manufactured housing.

### Statement of Problem and Substantiation for Public Input

The Standards Council has voted to withdraw NFPA 501, as of April 13, 2022. For ease in locating the Manufactured Home Construction and Safety Standards, the most complete reference on this is 24 CFR Part 3280.

Note: The word "Manufactured" appears as new text but was previous text that Terra View decided to underline for some reason.

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## Public Input No. 2797-NFPA 70-2023 [ Section No. 550.4 ]

### 550.4 General Requirements.

#### (A) In Other Than Mobile Home Parks.

Mobile homes installed in other than mobile home parks shall comply with the provisions of this article.

#### (B) Connection to Wiring System.

This article shall apply to mobile homes intended for connection to a wiring system rated 120/240 volts, nominal, 3-wire ac, with a grounded neutral conductor.

#### ~~(C) Listed and Labeled.~~

~~All electrical materials, devices, appliances, fittings, and other equipment shall be listed and labeled by a qualified testing agency and shall be connected in an approved manner when installed.~~

## Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document when general listing requirements are covered within an article. The NEC Style Manual Section 2.2.1 Parallel Numbering Required, states that technical committees shall use the following section numbers for the same purposes within articles. The listing requirements are to be located in the .2 section. The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<a href="#">Public Input No. 2798-NFPA 70-2023 [New Section after 550.1]</a>	Relocated text.
<a href="#">Public Input No. 2798-NFPA 70-2023 [New Section after 550.1]</a>	

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## Public Input No. 239-NFPA 70-2023 [ Section No. 550.10(B) ]

### (B) Power-Supply Cord.

If the mobile home has a power-supply cord, it shall be permanently attached to the panelboard enclosure , or to a junction box permanently connected to the panelboard enclosure , - with the free end terminating in an attachment plug cap.

Cords with adapters and pigtail ends, extension cords, and similar items shall not be attached to, or shipped with, a mobile home.

A suitable clamp or the equivalent shall be provided at the panelboard enclosure knockout to afford strain relief for the cord to prevent strain from being transmitted to the terminals when the power-supply cord is handled in its intended manner.

The cord shall be a listed type with four conductors, one of which shall be identified by a continuous green color or a continuous green color with one or more yellow stripes for use as the equipment grounding conductor.

## Statement of Problem and Substantiation for Public Input

The cord itself needs to be connected to the ENCLOSURE for the panelboard. The junction box would not be connected to the panelboard (busbars) it would be connected to the panelboard ENCLOSURE. This revision is needed to clarify the intent.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<a href="#">Public Input No. 238-NFPA 70-2023 [Section No. 408.5]</a>	panelboard enclosure vs panelboard busbars
<a href="#">Public Input No. 237-NFPA 70-2023 [Section No. 408.3(F)]</a>	panelboard enclosure vs panelboard busbars
<a href="#">Public Input No. 235-NFPA 70-2023 [Section No. 424.47]</a>	panelboard enclosure vs panelboard busbars
<a href="#">Public Input No. 240-NFPA 70-2023 [Section No. 552.43(B)]</a>	
<a href="#">Public Input No. 241-NFPA 70-2023 [Section No. 250.32(D)]</a>	

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**Committee:** NEC-P07

**Public Input No. 1511-NFPA 70-2023 [ Section No. 550.10(I) ]****(I) Mast Weatherhead or Raceway.**

Where the calculated load exceeds 50 amperes or where a permanent feeder is used, the supply shall be by means of either of the following:

- (1) One mast weatherhead installation, installed in accordance with Part II of Article 230, containing four continuous, insulated, color-coded feeder conductors, one of which shall be an equipment grounding conductor

- (2) A

~~rigid metal conduit, intermediate metal conduit, rigid polyvinyl chloride conduit, or other raceways identified for the location,~~

- (3) raceway from the disconnecting means in the mobile home to the underside of the mobile home, with provisions for the attachment to a suitable junction box or fitting to the raceway on the underside of the mobile home [with or without conductors as in 550.10(I)(1) ] shall be one fo the following:

(a) Rigid Metal Conduit .

(b) Intermediate Metal Conduit.

(c) Rigid Polyvinyl Chloride Conduit.

(d) other raceways identified for the location

The manufacturer shall provide written installation instructions stating the proper feeder conductor sizes for the raceway and the size of the junction box to be used.

**Statement of Problem and Substantiation for Public Input**

There were only (2) wiring approved raceway methods in the 2020 code for this section. There are now (4) approved raceway methods in this section and they should be in list form per the NEC style Manuel and for ease of use of the code.

**Submitter Information Verification**

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**Committee:** NEC-P07



## Public Input No. 1153-NFPA 70-2023 [ Section No. 550.12(D) ]

### (D) General Appliances.

(Including furnace, water heater, range, and central or room air conditioner, etc.). There shall be one or more circuits of adequate rating in accordance with the following:

Informational Note: See Article 440, Parts I through VI for central air conditioning.

- (1) The ampere rating of fixed appliances shall be not over 50 percent of the circuit rating if lighting outlets (receptacles, other than kitchen, dining area, and laundry, considered as lighting outlets) are on the same circuit.
- (2) For fixed appliances on a circuit without lighting outlets, the sum of rated amperes shall not exceed the branch-circuit rating. Motor loads or continuous loads shall not exceed 80 percent of the branch-circuit rating.
- (3) The rating of a single cord-and-plug-connected appliance on a circuit having no other outlets shall not exceed 80 percent of the circuit rating.
- (4) The rating of a range branch circuit shall be based on the range demand as specified for ranges in 550.18(B)(5).

## Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the NEC® Style Manual prohibit referencing an entire article except Article 100 or where required for context. As such, referencing Parts I through VI of Article 440 incorporates the requirements for central air conditioning, while not referencing the room air conditioning requirements of Part VII.

## Submitter Information Verification

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## Public Input No. 2519-NFPA 70-2023 [ Section No. 550.13(B) ]

### (B) Ground-Fault Circuit Interrupters (GFCI).

Ground-fault circuit-interrupter protection shall be provided as required in 210.8(A). ~~In addition, in the following areas within a mobile or manufactured home, GFCI protection is limited to 125-volt, 15- and 20-ampere receptacles or outlets:~~

- ~~Compartments accessible from outside the unit~~
- ~~Bathrooms, including receptacles in luminaires~~
- ~~Kitchens, where receptacles are installed to serve countertop surfaces~~
- ~~Sinks, where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the sink~~
- ~~Dishwashers~~

Informational Note: See 422.5(A) for information on protection of dishwashers.

## Statement of Problem and Substantiation for Public Input

The requirements in 210.8(A) have changed and require protection for more than 15 and 20 ampere receptacles in the listed areas. There is no reason to have different rules for GFCI protection in a conventional dwelling as compared to a mobile or manufactured dwelling. They are both dwelling units and the hazards to the occupants is the same in both types of housing.

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**Committee:** NEC-P07



## Public Input No. 1509-NFPA 70-2023 [ Section No. 550.15(F) ]

### (F) Raceways.

#### (1) Approved raceway methods:

(a) Rigid nonmetallic conduit.

(b) Electrical nonmetallic tubing.

(c) Electrical metallic tubing.

(d) Surface Metal Raceways.

(e) Surface nonmetallic Raceways

(f) Rigid Metallic Conduit.

(g) intermediate Metal Conduit.

(2) Where rigid metal conduit or intermediate metal conduit is terminated at an enclosure with a locknut and bushing connection, two locknuts shall be provided, one inside and one outside of the enclosure. - Rigid nonmetallic conduit, electrical nonmetallic tubing, or surface raceway shall be permitted.

(3) All cut ends of conduit and tubing shall be reamed or otherwise finished to remove rough edges.

## Statement of Problem and Substantiation for Public Input

This code article was broken out so that a list format could be used for approved raceway methods, per the NEC style manual, and then provide additional requirements for installation. This will help with the ease of the use of the code.

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**Zip:**

**Submittal Date:** Sat Jul 22 13:14:52 EDT 2023

**Committee:** NEC-P07

**Public Input No. 2330-NFPA 70-2023 [ Section No. 550.15(I) ]****(I) Boxes, Fittings, and Cabinets.**

Boxes, fittings, and cabinets shall be securely fastened in place and shall be supported from a structural member of the home, either directly or by using a substantial brace. (add clarifying language regarding substantial brace)

*Exception: Snap-in-type boxes. Boxes provided with special wall or ceiling brackets and wiring devices with integral enclosures that securely fasten to walls or ceilings and are identified for the use shall be permitted without support from a structural member or brace. The testing and approval shall include the wall and ceiling construction systems for which the boxes and devices are intended to be used.*

**Statement of Problem and Substantiation for Public Input**

550.15 (I) – add clarity to lessen ambiguity and reduce speculation as to what is meant/required by the requirement “..... or by using a substantial brace”. The current language is ambiguous and very subjective. Consider referencing or adapting language from article 314.23 with an emphasis on 314.23 (B) and 314.23 (B) (2). Clarity, elimination of ambiguity work and consistency regarding the use of terms strengthens the NEC.

**Submitter Information Verification**

**Submitter Full Name:** Gary Hein

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Wed Aug 16 12:40:52 EDT 2023

**Committee:** NEC-P07





## Public Input No. 2414-NFPA 70-2023 [ Section No. 550.16(C)(4) ]

### (4) Metallic Roof and Exterior Coverings.

Any metallic roof and exterior covering shall be considered bonded if the following conditions are met:

- (1) The metal panels overlap one another and are securely attached to the wood or metal frame parts by metallic fasteners.
- (2) The lower panel of the metallic exterior covering is secured by metallic fasteners at a cross member of the chassis by two metal straps per mobile home unit or section at opposite ends.

The bonding strap material shall be a minimum of 100 mm (4 in.) in width of material equivalent to the skin or a material of equal or better electrical conductivity. The straps shall be fastened with paint-penetrating fittings such as screws and environmentally sealed (as air-tight and water-tight) starwashers or equivalent.

## Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
PI_2414_Attachment_C_.pdf		

## Statement of Problem and Substantiation for Public Input

Secure grounding and bonding connections are essential to a safe electrical system. Grounding is essential to ensure a safe return path for electrical current. Bonding ensures that all metal parts of electrical equipment have the same electrical potential, reducing the risk of shock hazard and damage. Both grounding and bonding are necessary for an electrical system to ensure safety, reliability, and performance.

The effects of corrosion on grounding and bonding connections, especially outdoors or in humid or corrosive environments are significant. Humidity causes metals to corrode and can accelerate the galvanic action caused by using dissimilar metals used to bond electrical equipment. Corrosive atmospheres, such as in a swimming pool equipment room can quickly corrode grounding and bonding connections, rendering them unsafe.

Galvanic corrosion is an electrochemical process in which one metal corrodes preferentially when it is in electrical contact with another, in the presence of an electrolyte, such as water. By keeping the electrolyte away from the connection, corrosion can be significantly reduced.

Connections using dissimilar metals will quickly corrode when exposed to weather or corrosive conditions, causing failure of the bonding pathway. Corrosion is a major problem for electrical connections, as it can lead to increased resistance and heating. Corrosion can lead to connections becoming oxidized, creating a high resistance contact, and can ultimately lead to the failure of the connection. Poor grounding and bonding connections can result in an electrical potential on exposed metal parts, which may result in property damage, injury, or death.

Corrosion is a natural phenomenon which occurs under certain moisture, temperature and atmospheric conditions; it cannot be avoided, only mitigated. Corrosion weakens products therefore affecting their function and integrity.

Corrosion is a large problem. A 2002 study by the National Association of Corrosion Engineers, backed by the Federal Highway Administration, estimated corroding metals in various industries, infrastructure and manufacturing cost \$276 billion annually.

For example, the United States Consumer Product Safety Commission (CPSC) ordered a recall of 1.3 million grounding lugs due to corrosion issues in 2014. Although no deaths were attributed to the recall, the cost to replace the lugs was significant.

In another case, a recent article illustrated significant lightning damage to Orange County Florida's public emergency communications equipment. <sup>1</sup> The damage was caused by lightning strikes and corrosion of bonding connections on lightning protection conductors. These damages were between one and two million dollars over a ten-year period.

According to the CPSC, approximately 90 people are electrocuted annually in the United States due to appliances or wiring issues. There are also at least 30,000 non-fatal shock incidents per year in the United States. Each year, approximately 5% of all burn unit admissions in the United States occur because of electrical injuries.

Preventing corrosion of grounding and bonding connections in wet, damp, or corrosive atmospheres can be challenging. Equipment located in these conditions are exposed to the elements, which can result in atypical situations where the usual practices for bonding may not perform as intended. For example, many listed grounding lugs are not designed to be installed outdoors; using a lug that is not rated for outdoor use can lead to premature failures in the intended path for fault current, impairing the functionality of overcurrent and ground-fault protection devices. Other issues include corrosion of bonding connections due to galvanic action.

Grounding lugs can damage the protective anodized coating on aluminum module frames and rails. For example, some manufacturers suggest scraping, cutting, or scuffing the anodized coating. Unless the connection is sealed (as air-tight and water-tight) from the elements, the aluminum becomes exposed to the environment which increases the rate of oxidation and galvanic corrosion. Corrosion at the connection will cause an increase in the connection's resistance, and eventual failure of the bond. However, some equipment manufacturers do not permit removal of the protective anodized coating, such as galvanization, to make electrical contact. This is because removal of the coating will facilitate corrosion.

Tests conducted on a variety of bonding connections indicated that most typical connections failed quickly when exposed to deteriorating agents. Damp-heat resistances were relatively unchanged over a 20-week period. However, most samples corroded in just a few weeks for the salt-mist tests. Samples using an antioxidant lasted slightly longer before failing. Lay-in lugs with washers and grounding clips and compound lasted more than 20 weeks in the salt mist condition, but still failed. <sup>2</sup>

Using connection hardware that is environmentally sealed (as air-tight and water-tight) against the effects of corrosion will not only make installations safer but will reduce costs for the owner/operator.

Using an environmentally sealed electrical bonding device and bonding fastener with environmental seals creates an air-tight and water-tight seal around the teeth which make the electrical bonding connection and protect it from corrosion. As the nut and bolt are tightened the twisted teeth bite into the facing surfaces of the frames to penetrate any surface corrosion or coating and create a solid electrical connection that is air-tight and water-tight sealed against the elements and the effects of corrosion. Please refer to Attachments 1-4 for photographs of environmentally sealed washers. As can be seen in Attachments 3 and 4, the washer clearly provided good contact with the aluminum surface, while the silicone protects the connection from corrosion.

Environmentally sealed hardware creates more secure electrical connections by providing 360-degree protection against corrosion and degradation. This is achieved by embedding the washer in an air and watertight silicone layer. The silicone layer prevents moisture and other contaminants from coming into contact with the washer and mating surface, which can help to prevent corrosion and degradation of the electrical connection.

As a result of these benefits, environmentally sealed hardware can help to create more secure electrical connections that are less likely to fail. This is important for safety, as it can help to prevent electrical fires and other hazards. Environmentally sealed hardware is also important for reliability, as they can help to ensure that electrical connections remain functional for longer periods of time.

Here are some of the specific benefits of using environmentally sealed connections:

- Increased resistance to corrosion
- Reduced risk of electrical fires and shock hazards
- Improved reliability
- Longer lifespan

Notes:

1. All-Copper Grounding Systems End Million Dollar Losses at Emergency Response System. [West, Donnelly, Sorley, 2016]
2. Accelerated Aging Tests on PV Grounding Connections [Wang et al., 2011]

## Submitter Information Verification

**Submitter Full Name:** Merton Bunker

**Organization:** Merton Bunker & Associates, LLC

**Affiliation:** Evan W. Lipstein, Hyline Safety Company

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Thu Aug 17 06:15:46 EDT 2023

**Committee:** NEC-P07

Merton Bunker & Associates, LLC

Stafford, VA 22554

September 2, 2023

National Fire Protection Association

Attn: Standards Administration

1 Batterymarch Park

Quincy, MA 02169

Please see the attached supporting material and related permission to use the material for Public Inputs 2411, 2412, 2413, 2414, 2415, 2492, and 2493. These attachments are the same for all referenced Public Inputs.

I am submitting this PI on behalf of HYLIN SAFETY COMPANY.

The material in all four attachments is not copyrighted; however, I have included permission to publish them from the originator of these attachments, Mr. Evan W. Lipstein.

Thank you in advance for your attention to this matter. If you have any questions or concerns, please contact me at the phone number below.

Very truly yours,

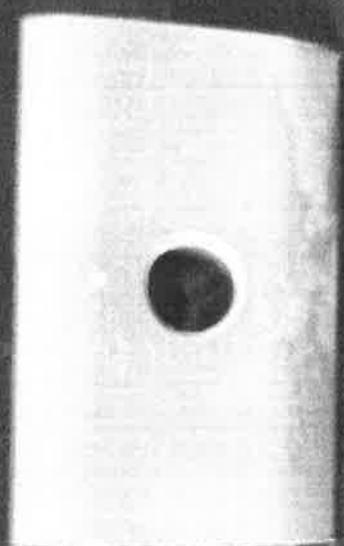


Merton Bunker, PE.

# Attachment #1

Hardware with an environmentally sealed washer.

For Public Inputs 2411, 2412, 2413, 2414, 2415, 2492, and 2493.

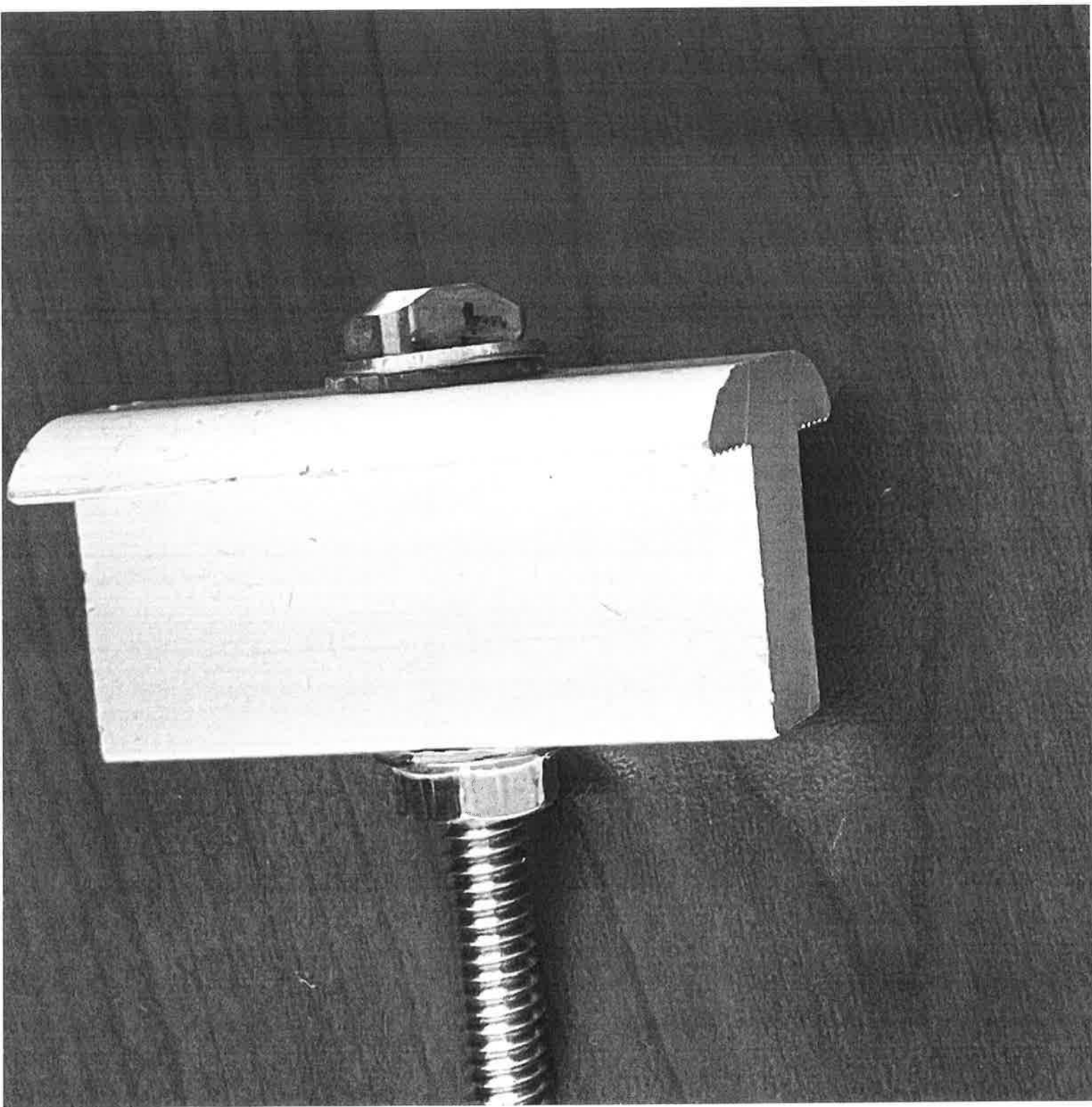


## Attachment #2

Hardware with an environmentally sealed washer.

For Public Inputs 2411, 2412, 2413, 2414, 2415, 2492, and 2493.

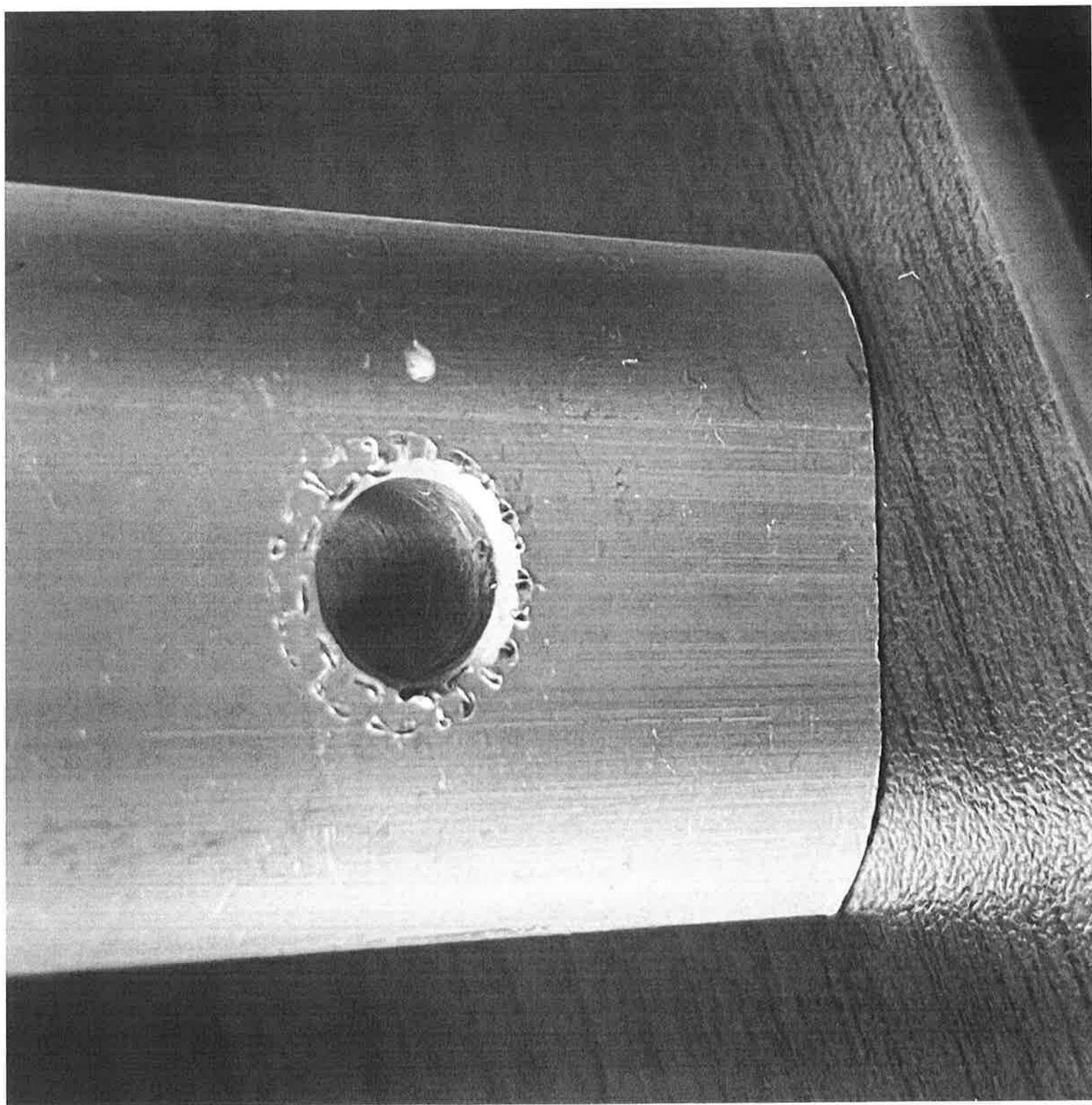




## **Attachment #3**

Aluminum surface showing contact by environmentally sealed washer.

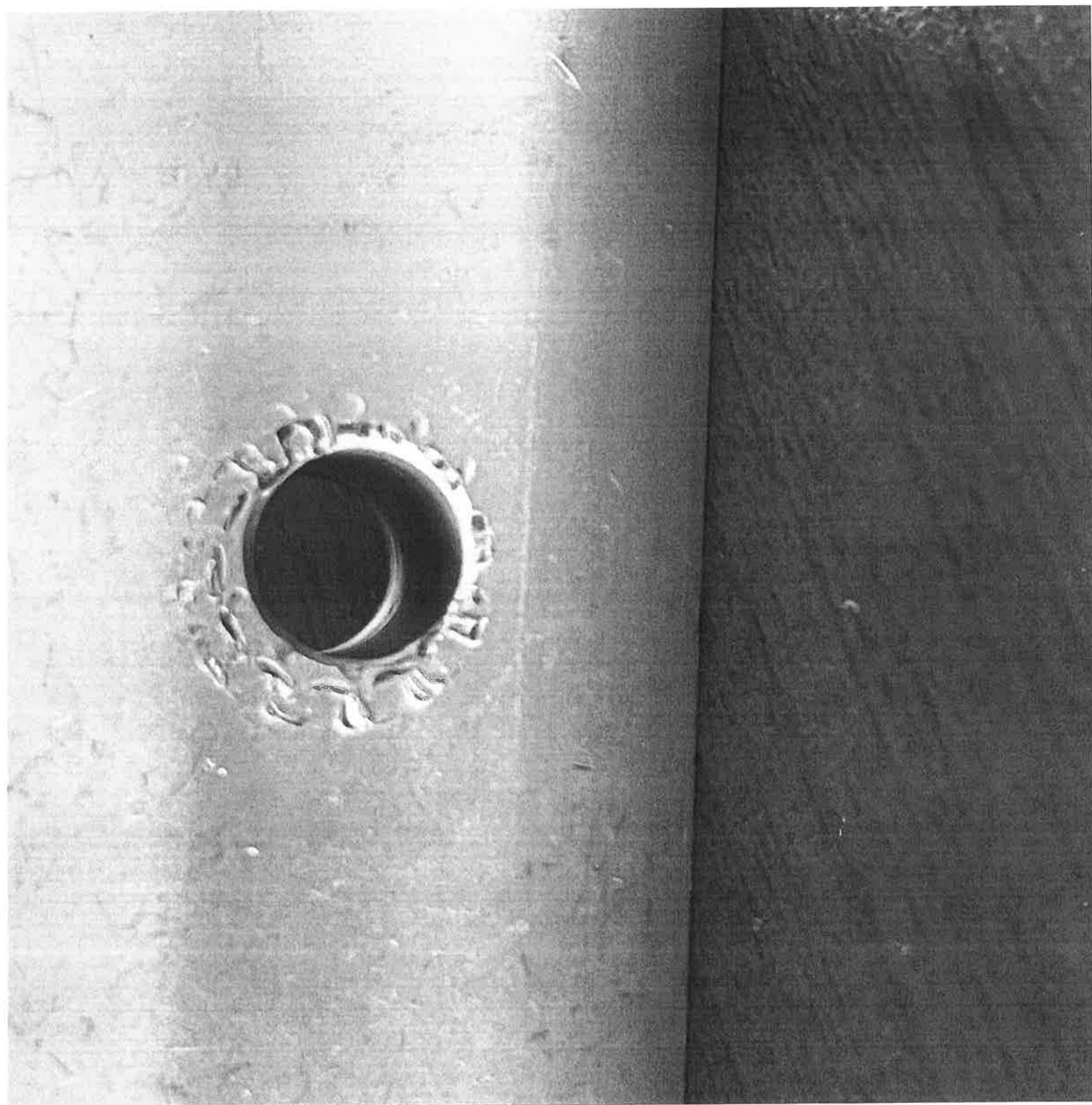
For Public Inputs 2411, 2412, 2413, 2414, 2415, 2492, and 2493.



## Attachment #4

Aluminum surface showing contact by environmentally sealed washer.

For Public Inputs 2411, 2412, 2413, 2414, 2415, 2492, and 2493.



**Public Input No. 1508-NFPA 70-2023 [ Section No. 550.18 ]****550.18** Calculations.

The following method shall be employed in calculating the supply-cord and distribution-panelboard load for each feeder assembly for each mobile home in lieu of the procedure shown in Article 220 and shall be based on a 3-wire, 120/240-volt supply with 120-volt loads balanced between the two ungrounded conductors of the 3-wire system.

Informational Note: See Informative Annex D, Example D11, for an illustration of the application of this calculation.

**(A)** Lighting, Small-Appliance, and Laundry Load.

**(1)** Lighting Volt-Amperes.

Length times width of mobile home floor (outside dimensions) times 33 volt-amperes/m<sup>2</sup> (3 VA/ft<sup>2</sup>)—~~for example, length × width × 3 = lighting volt-amperes.~~

**(2)** Small-Appliance Volt-Amperes.

Number of circuits times 1500 volt-amperes for each 20-ampere appliance receptacle circuit—~~for example, number of circuits × 1500 = small-appliance volt-amperes.~~ circuit

**(3)** Laundry Area Circuit Volt-Amperes.

1500 volt-amperes.

**(4)** Total Volt-Amperes.

Lighting volt-amperes plus small-appliance volt-amperes plus laundry area volt-amperes equals total volt-amperes.

**(5)** Net Volt-Amperes.

First 3000 total volt-amperes at 100 percent plus remainder at 35 percent equals volt-amperes to be divided by 240 volts to obtain current (amperes) per leg.

**(B) Total Load for Determining Power Supply.**

Total load for determining power supply is the sum of the following:

- (1) Lighting and small-appliance load as calculated in 550.18(A)(5).
- (2) Nameplate amperes for motors and heater loads (exhaust fans, air conditioners, electric, gas, or oil heating). Omit smaller of the heating and cooling loads, except include blower motor if used as air-conditioner evaporator motor. Where an air conditioner is not installed and a 40-ampere power-supply cord is provided, allow 15 amperes per leg for air conditioning.
- (3) Twenty-five percent of current of largest motor in 550.18(B)(2).
- (4) Total of nameplate amperes for waste disposer, dishwasher, water heater, clothes dryer, wall-mounted oven, cooking units. Where the number of these appliances exceeds three, use 75 percent of total.
- (5) Derive amperes for freestanding range (as distinguished from separate ovens and cooking units) by dividing the following values by 240 volts as shown in Table 550.18(B).
- (6) If outlets or circuits are provided for other than factory-installed appliances, include the anticipated load.

**Informational Note:** See Informative Annex D, Example D11, for an illustration of the application of this calculation.

**Table 550.18(B) Freestanding Range Load**

<u>Nameplate Rating</u>	<u>Use</u>
<u>(watts)</u>	<u>(volt-amperes)</u>
<u>0–10,000</u>	<u>80 percent of rating</u>
<u>Over 10,000–12,500</u>	<u>8,000</u>
<u>Over 12,500–13,500</u>	<u>8,400</u>
<u>Over 13,500–14,500</u>	<u>8,800</u>
<u>Over 14,500–15,500</u>	<u>9,200</u>
<u>Over 15,500–16,500</u>	<u>9,600</u>
<u>Over 16,500–17,500</u>	<u>10,000</u>

**(C) Optional Method of Calculation for Lighting and Appliance Load.**

The optional method for calculating lighting and appliance load shown in 220.82 shall be permitted.

**Statement of Problem and Substantiation for Public Input**

the examples written into the code were removed because they were not needed, there are examples in the index and the informational note on where to find load calculations examples was moved to the top of the section to help those who need an example find where to look for them.

**Submitter Information Verification**

**Submitter Full Name:** IEC National

**Organization:** IEC

**Affiliation:** Jake Gray

**Street Address:**

**City:**



**State:**

**Zip:**

**Submittal Date:** Sat Jul 22 12:59:40 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1158-NFPA 70-2023 [ Section No. 550.18 [Excluding any Sub-Sections] ]

The following method shall be employed in calculating the supply-cord and distribution-panelboard load for each feeder assembly for each mobile home in lieu of the procedure shown in Article 220- ~~and~~ , Parts I through IV, ~~and~~ shall be based on a 3-wire, 120/240-volt supply with 120-volt loads balanced between the two ungrounded conductors of the 3-wire system.

### Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the NEC® Style Manual prohibits referencing an entire article with the exception of Article 100 or where required for context. As such, it is recommended that we instead reference the parts of Article 220 we're specifically referring to here, and I've done so suggesting that the Farm Loads part, the Health Care part, and the Marinas/Boatyard portions are not intended to be referenced here.

### Submitter Information Verification

**Submitter Full Name:** Richard Holub

**Organization:** The DuPont Company, Inc.

**Street Address:**

**City:**

**State:**

**Zip:**

**Submission Date:** Wed Jun 21 08:40:10 EDT 2023

**Committee:** NEC-P07

**Public Input No. 2044-NFPA 70-2023 [ Section No. 550.32 ]****550.32** Service Equipment.**(A)** Mobile Home Service Equipment.

The mobile home service equipment shall not be mounted in or on the mobile home. The service equipment shall be rated not less than that required in accordance with 550.32(C), mounted in a readily accessible outdoor location, and within sight from the mobile home it serves. The mobile home service disconnect shall be permitted to be used as the emergency disconnect in accordance with 230.85.

**(B) Manufactured Home Service Equipment.**

The manufactured home service equipment shall be permitted to be installed in or on a manufactured home, provided that all of the following conditions are met:

- (1) The manufacturer shall include in its written installation instructions information indicating that the home shall be secured in place by an anchoring system or installed on and secured to a permanent foundation.
- (2) The installation of the service shall comply with Part I through Part VII of Article 230.
- (3) Means shall be provided for the connection of a grounding electrode conductor to the service equipment and routing it outside the structure.
- (4) Bonding and grounding of the service shall be in accordance with Part I through Part V of Article 250.
- (5) The manufacturer shall include in its written installation instructions one method of grounding the service equipment at the installation site. The instructions shall clearly state that other methods of grounding are found in Article 250.
- (6) The minimum size grounding electrode conductor shall be specified in the instructions.
- (7) A warning label shall be mounted on or adjacent to the service equipment. The label shall meet the requirements in 110.21(B) and shall state the following:

WARNING

DO NOT PROVIDE ELECTRICAL POWER

UNTIL THE GROUNDING ELECTRODE(S)

IS INSTALLED AND CONNECTED

(SEE INSTALLATION INSTRUCTIONS).

Where the service equipment is not installed in or on the unit, the installation shall comply with the other requirements of this section.

**(C) Rating.**

Mobile home service equipment shall be rated at not less than 100 amperes at 120/240 volts, and provisions shall be made for connecting a mobile home feeder assembly by a permanent wiring method. Power outlets used as mobile home service equipment shall also be permitted to contain receptacles rated up to 50 amperes with appropriate overcurrent protection. Fifty-ampere receptacles shall conform to the configuration shown in Figure 550.10(C).

Informational Note: See ANSI/NEMA WD 6-2016, *Wiring Devices — Dimensional Specifications*, Figure 14-50, for complete details of the 50-ampere plug and receptacle configuration.

**(D) Additional Outside Electrical Equipment.**

Means for connecting a mobile home accessory building or structure or additional electrical equipment located outside a mobile home by a fixed wiring method shall be provided in either the mobile home service equipment or the local external disconnecting means permitted in 550.32(A).

**(E) Replacement Home.**

When existing service equipment is reconnected to a replacement mobile or manufactured home, the service shall be provided with a surge protective device in accordance with 230.67.

**(F) Additional Receptacles.**

Receptacles located outside a mobile or manufactured home shall be provided with ground-fault circuit-interrupter protection as specified by 210.8(A). Where receptacles provide power to a mobile or manufactured home in accordance with 550.10, ground-fault circuit-interrupter protection shall not be required.

**(F G) Mounting Height.**

Outdoor mobile home disconnecting means shall be installed so the bottom of the enclosure containing the disconnecting means is not less than 600 mm (2 ft) above finished grade or working platform. The disconnecting means shall be installed so that the center of the grip of the operating handle, when in the highest position, is not more than 2.0 m (6 ft 7 in.) above the finished grade or working platform.

**(G H) Marking.**

Where a 125/250-volt receptacle is used in mobile home service equipment, the service equipment shall be marked as follows:

TURN DISCONNECTING SWITCH OR

CIRCUIT BREAKER OFF BEFORE INSERTING

OR REMOVING PLUG. PLUG MUST BE FULLY

INSERTED OR REMOVED.

The marking shall be located on the service equipment adjacent to the receptacle outlet.

**Statement of Problem and Substantiation for Public Input**

This public input is being submitted on behalf of the Minnesota Department of Labor and Industry. Currently, the Department's inspection staff includes 14-office/field staff, 12-state field inspectors, 2-virtual inspectors and 50 plus contract electrical inspectors that complete over 170,000 electrical inspections annually.

The new language would address the replacement of an existing mobile or manufactured home and require a surge protective device in the service disconnect. This language would help the AHJ enforce surge protection on existing services when the mobile or manufactured home is reconnected or

replaced. These homes are considered “dwelling units” and should have the same protections in place for the life safety signaling devices.

### Submitter Information Verification

**Submitter Full Name:** Dean Hunter

**Organization:** Minnesota Department of Labor

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Aug 11 11:35:02 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2043-NFPA 70-2023 [ Section No. 550.32(A) ]

### (A) Mobile Home Service Equipment.

The mobile home service equipment shall not be mounted in or on the mobile home. The service equipment shall be rated not less than that required in accordance with 550.32(C), ~~mounted in a readily accessible outdoor location, and within sight from the mobile home it serves~~ . The installation of the service equipment shall comply with Part I through Part VII of Article 230 . The mobile home service disconnect shall be permitted to be used as the emergency disconnect in accordance with 230.85.

### Statement of Problem and Substantiation for Public Input

This public input is being submitted on behalf of the Minnesota Department of Labor and Industry. Currently, the Department's inspection staff includes 14-office/field staff, 12-state field inspectors, 2-virtual inspectors and 50 plus contract electrical inspectors that complete over 170,000 electrical inspections annually.

By adding similar language as 550.32(B), the general requirements for service equipment would apply to mobile homes for consistency. The deleted text would be covered by the requirements Part V of article 230.

### Submitter Information Verification

**Submitter Full Name:** Dean Hunter

**Organization:** Minnesota Department of Labor

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Aug 11 11:31:06 EDT 2023

**Committee:** NEC-P07



**Public Input No. 1159-NFPA 70-2023 [ Section No. 550.32(B) ]****(B) Manufactured Home Service Equipment.**

The manufactured home service equipment shall be permitted to be installed in or on a manufactured home, provided that all of the following conditions are met:

- (1) The manufacturer shall include in its written installation instructions information indicating that the home shall be secured in place by an anchoring system or installed on and secured to a permanent foundation.
- (2) The installation of the service shall comply with ~~Part I through Part VII of Article 230~~ with Article 230, Parts I through IV .
- (3) Means shall be provided for the connection of a grounding electrode conductor to the service equipment and routing it outside the structure.
- (4) Bonding and grounding of the service shall be in accordance with Article 250, Part I through Part V ~~of Article 250~~ .
- (5) The manufacturer shall include in its written installation instructions one method of grounding the service equipment at the installation site. The instructions shall clearly state that other methods of grounding are found in Article 250, Parts I through V .
- (6) The minimum size grounding electrode conductor shall be specified in the instructions.
- (7) A warning label shall be mounted on or adjacent to the service equipment. The label shall meet the requirements in 110.21(B) and shall state the following:

WARNING

DO NOT PROVIDE ELECTRICAL POWER

UNTIL THE GROUNDING ELECTRODE(S)

IS INSTALLED AND CONNECTED

(SEE INSTALLATION INSTRUCTIONS).

Where the service equipment is not installed in or on the unit, the installation shall comply with the other requirements of this section.

## Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the NEC® Style Manual prohibits referencing an entire article except Article 100 or where required for context. Referencing all the parts of an article is thus prohibited. In (2), it's suggested that the Farm Loads part, the Health Care part, and the Marinas/Boatyard parts are really not applicable in the context of this requirement and can thus be omitted. In (4), the only change recommended was to invert the order of the article and parts in accordance with 4.1.4 of the Style Manual. List item (5) was revised to reference the specific grounding parts of Article 250 to comply with 4.1.4.

## Submitter Information Verification

**Submitter Full Name:** Richard Holub

**Organization:** The DuPont Company, Inc.

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Wed Jun 21 08:45:20 EDT 2023

**Committee:** NEC-P07

**Public Input No. 2763-NFPA 70-2023 [ Section No. 550.32(B) ]****(B) Manufactured Home Service Equipment.**

The manufactured home service equipment shall be permitted to be installed in or on a manufactured home, provided that all of the following conditions are met:

- (1) The manufacturer shall include in its written installation instructions information indicating that the home shall be secured in place by an anchoring system or installed on and secured to a permanent foundation.
- (2) The installation of the service shall comply with Article 230, Part I through Part VII of ~~Article 230~~.
- (3) Means shall be provided for the connection of a grounding electrode conductor to the service equipment and routing it outside the structure.
- (4) Bonding and grounding of the service shall be in accordance with Article 250, Part I through Part V of ~~Article 250~~.
- (5) The manufacturer shall include in its written installation instructions one method of grounding the service equipment at the installation site. The instructions shall clearly state that other methods of grounding are found in Article 250.
- (6) The minimum size grounding electrode conductor shall be specified in the instructions.
- (7) A warning label shall be mounted on or adjacent to the service equipment. The label shall meet the requirements in 110.21(B) and shall state the following:

WARNING

DO NOT PROVIDE ELECTRICAL POWER

UNTIL THE GROUNDING ELECTRODE(S)

IS INSTALLED AND CONNECTED

(SEE INSTALLATION INSTRUCTIONS).

Where the service equipment is not installed in or on the unit, the installation shall comply with the other requirements of this section.

## Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.

4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

## Submitter Information Verification

**Submitter Full Name:** David Williams

**Organization:** Delta Charter Township

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Thu Aug 24 20:17:43 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1510-NFPA 70-2023 [ Section No. 550.32(E) ]

### (E) Additional Receptacles.

~~Receptacles located outside a mobile or manufactured home shall be provided with ground-fault circuit-interrupter protection as specified by 210.8(A) .Where~~

### GFCI Protection.

Where receptacles provide power to a mobile or manufactured home in accordance with 550.10, ground-fault circuit-interrupter protection shall not be required.

## Statement of Problem and Substantiation for Public Input

550.32 refers to service equipment, any receptacle that is outside of the mobile home and is outdoors is already required to be GFCI protected by 210.8 and this does not need to be restated. This sections was re-titled to GFCI protection because we are not requiring the feeder outlet providing power to the mobile to have GFCI protection at this time.

## Submitter Information Verification

**Submitter Full Name:** IEC National

**Organization:** IEC

**Affiliation:** Jake Gray

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Sat Jul 22 13:40:29 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1494-NFPA 70-2023 [ Section No. 550.33(A) ]

### (A) Feeder Equipment.

The feeder assembly, including the disconnecting means, shall not be mounted in or on the mobile home. A manufactured home feeder disconnecting means shall be permitted to be installed in or on the manufactured home in accordance with the requirements of 550.32(B). The feeder equipment shall be rated not less than that required in 550.32(C), mounted in a readily accessible outdoor location, and within sight from the mobile home or manufactured home it serves. Grounding of the mobile home or manufactured home feeder assembly disconnecting means shall be in accordance with 250.32. Grounding of the required 550.11A mobile home disconnecting means shall be in accordance with 250.32.

## Statement of Problem and Substantiation for Public Input

550.33A addresses Feeder Equipment for both mobile homes and manufactured homes. The current last sentence is "Grounding of the disconnecting means shall be in accordance with 250.32". Possibly, the added wording of this public input isn't necessary because according to 550.33A, it can be read that a grounding electrode system is required for both the (detached from the mobile home) feeder assembly disconnect and the mobile home's required 550.11A disconnect which is located in the mobile home. This public input adds clarity by stating a grounding electrode system is required for both.

A 250.32A grounding electrode system should be required at mobile homes in addition to the already required 250.32B equipment grounding conductor. In past NEC editions (and possibly 2023 NEC), mobile homes did not require a grounding electrode system at the mobile home itself like manufactured homes. The grounding electrode system was only required at the mobile home service equipment; using the NEC definition of service. A grounding electrode system at a mobile home is as necessary as the grounding electrode system is for any feeder supplied building or structure. A mobile home isn't equipment and is defined as a structure or structures.

No NEC text prohibits using the same grounding electrode system for both the feeder assembly disconnect and the 550.11A mobile home disconnect, if that proves to be a more convenient installation where the feeder assembly disconnect is physically near the mobile home.

No part of current NEC language regarding the 250.32B required equipment grounding conductor is disputed or part of this public input.

## Submitter Information Verification

**Submitter Full Name:** Norman Feck

**Organization:** State of Colorado

**Affiliation:** self

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jul 21 17:15:04 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1160-NFPA 70-2023 [ Section No. 551.4(C) ]

### (C) Labels.

Labels required by ~~Article 551~~ this article shall be made of etched, metal-stamped, or embossed brass; stainless steel; plastic laminates not less than 0.13 mm (0.005 in.) thick; or anodized or alclad aluminum not less than 0.5 mm (0.020 in.) thick or the equivalent.

Informational Note: See ANSI Z535.4-2011, *Product Safety Signs and Labels*, for guidance on other label criteria used in the recreational vehicle industry.

## Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the NEC® style manual prohibits referencing an entire article with the exception of Article 100 or where required for context. In this case, simply altering the text to "this article" complies with the style manual requirement without changing the meaning of the current rule.

## Submitter Information Verification

**Submitter Full Name:** Richard Holub

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**Street Address:**

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**Submittal Date:** Wed Jun 21 08:54:48 EDT 2023

**Committee:** NEC-P07



**Public Input No. 3137-NFPA 70-2023 [ Section No. 551.20(B) ]****(B) Voltage Converters (120-Volt Alternating Current to Low-Voltage Direct Current).**

The 120-volt ac side of the voltage converter shall be wired in full conformity with the requirements of Parts I, II, and IV of this article for 120-volt electrical systems.

*Exception: Converters supplied as an integral part of a listed appliance shall not be subject to 551.20(B).*

All converters and transformers shall be listed for use in recreational vehicles and designed or equipped to provide overtemperature protection. To determine the converter rating, the following percentages shall be applied to the total connected load, ~~including average battery-charging rate, of~~ of all 12-volt equipment:

The first 20 amperes of load at 100 percent plus

The second 20 amperes of load at 50 percent plus

All load above 40 amperes at 25 percent

*Exception: A low-voltage appliance that is controlled by a momentary switch (normally open) that has no means for holding in the closed position or refrigerators with a 120-volt function shall not be considered as a connected load when determining the required converter rating. Momentarily energized appliances shall be limited to those used to prepare the vehicle for occupancy or travel.*

**Statement of Problem and Substantiation for Public Input**

The text deleted is outdated technology. Converters (Linear) had a separate charging circuit which is why they were required to have the Average Battery Charging Rate included in converter sizing.

**Submitter Information Verification**

**Submitter Full Name:** Curt Richardson

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**Street Address:**

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**Submittal Date:** Tue Aug 29 15:41:17 EDT 2023

**Committee:** NEC-P07



## Public Input No. 3229-NFPA 70-2023 [ Section No. 551.40(D) ]

### (D) ~~Loss of Ground Device~~ Electrical Management System (EMS) .

Each recreational vehicle shall have a listed ~~grounding monitor interrupter~~ EMS permanently installed ~~between~~ after the feeder assembly connection to the vehicle ~~and before either a transfer switch if installed or the panelboard~~. ~~This requirement shall become effective January 1, 2026~~ . The EMS shall provide protection under the conditions of an open grounded conductor, an open neutral conductor, and the reversal of the ungrounded and grounded conductors in the 120V AC system .

## Statement of Problem and Substantiation for Public Input

As of the deadline date (September 07, 2023) of public input to the 2026 edition of the NEC, there is not a published listing standard to evaluate a grounding monitor interrupter device against. The recreational vehicle industry has existing aftermarket and OEM installed products that perform similar functionality to the intended protection level of a grounding monitor interrupter. The expansion from only a ground monitor interrupter to an EMS will provide a better level of protection to the recreational vehicle user.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 3233-NFPA 70-2023 [New Definition after Definition: Electrical Life Support Eq...]	

## Submitter Information Verification

**Submitter Full Name:** David Mihalick  
**Organization:** Thor Industries Inc.  
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**Submittal Date:** Wed Aug 30 14:28:56 EDT 2023  
**Committee:** NEC-P07



## Public Input No. 3982-NFPA 70-2023 [ Section No. 551.40(D) ]

### (D) Loss of Ground Device.

Each recreational vehicle shall have a listed grounding monitor interrupter device permanently installed between the feeder assembly connection to the vehicle and ~~before either a transfer switch if installed or~~ the panelboard. This requirement shall become effective January 1, 2026.

NOTE: Electrical circuit protective systems shall contain over and under voltage protection, open ground protection, open neutral protection, and reverse polarity.

### Statement of Problem and Substantiation for Public Input

Currently there is not a complete standard to evaluate a grounding monitor interrupter to, the industry has some existing listed after market products that perform similar functionality to the intended protection level of a grounding monitor interrupter.

### Submitter Information Verification

**Submitter Full Name:** Curt Richardson

**Organization:** Recreation Vehicle Industry As

**Street Address:**

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**Submittal Date:** Wed Sep 06 12:00:23 EDT 2023

**Committee:** NEC-P07



## Public Input No. 134-NFPA 70-2023 [ Section No. 551.41(C) ]

### (C) Ground-Fault-Circuit-Interrupter Protection GFCI Protection .

Where provided, each 125-volt, single-phase, 15- or 20-ampere receptacle outlet shall have ~~ground-fault-circuit-interrupter protection~~ GFCI protection for personnel in the following locations:

- (1) Adjacent to a bathroom lavatory
- (2) Where the receptacles are installed to serve the countertop surfaces and are within 1.8 m (6 ft) of any lavatory or sink

*Exception No. 1: Receptacles installed for appliances in dedicated spaces, such as for disposals, refrigerators, and freezers shall not require ground-fault circuit-interrupter protection.*

*Exception No. 2: Single receptacles for interior connections of expandable room sections shall not require ground-fault circuit-interrupter protection.*

*Exception No. 3: De-energized receptacles that are within 1.8 m (6 ft) of any sink or lavatory due to the retraction of the expandable room section shall not require ground-fault circuit-interrupter protection.*

- (3) In the area occupied by a toilet, shower, tub, or any combination thereof
- (4) On the exterior of the vehicle

*Exception: Receptacles that are located inside of an access panel that is installed on the exterior of the vehicle to supply power for an installed appliance shall not be required to have ground-fault circuit-interrupter protection.*

- (5) In the special transportation area of a recreational vehicle that is separated from the living area by a wall

The receptacle outlet shall be permitted in a listed luminaire. A receptacle outlet shall not be installed in a tub or combination tub–shower compartment.

## Statement of Problem and Substantiation for Public Input

Editorial only. No technical changes here. This revision seeks to mimic GFCI language used throughout the Code

## Submitter Information Verification

**Submitter Full Name:** Russ Leblanc

**Organization:** Leblanc Consulting Services

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**Submission Date:** Wed Jan 11 15:25:45 EST 2023

**Committee:** NEC-P07



## Public Input No. 3134-NFPA 70-2023 [ Section No. 551.46(A) [Excluding any Sub-Sections] ]

The feeder ~~assembly or assemblies shall~~ assembly shall be factory supplied or factory installed and be of one of the types specified herein.

### Statement of Problem and Substantiation for Public Input

RVs are only allowed to have one Feeder Assembly as referenced in 551.44 Power Supply Assembly. Each RV shall have only one of the main power assemblies covered in 551.44(A) through 551.44(D).

### Submitter Information Verification

**Submitter Full Name:** Curt Richardson

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**City:**

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**Submittal Date:** Tue Aug 29 15:13:37 EDT 2023

**Committee:** NEC-P07



## Public Input No. 3135-NFPA 70-2023 [ Section No. 551.46(C)(4) ]

### (4) Units with 50-Ampere ~~Power-Supply~~ Feeder Assembly.

Recreational vehicles having a ~~power-supply assembly~~ feeder assembly rated 50 amperes as permitted by 551.42(D) shall have a 3-pole, 4-wire grounding-type attachment plug rated 50 amperes, 125/250 volts, conforming to the configuration shown in Figure 551.46(C)(1).

Informational Note: See ANSI/NEMA WD 6-2016, *Wiring Devices — Dimensional Specifications*, Figure 14.50, for complete details of this configuration.

## Statement of Problem and Substantiation for Public Input

Definition for power-supply assembly was changed in the 2023 edition to feeder assembly.

## Submitter Information Verification

**Submitter Full Name:** Curt Richardson

**Organization:** Recreation Vehicle Industry As

**Street Address:**

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**Zip:**

**Submittal Date:** Tue Aug 29 15:24:49 EDT 2023

**Committee:** NEC-P07



## Public Input No. 3136-NFPA 70-2023 [ Section No. 551.46(E) ]

### (E) Location.

The point of entrance of a ~~power-supply~~ feeder assembly shall be located within 4.5 m (15 ft) of the rear, on the left (road) side or at the rear, left of the longitudinal center of the vehicle, within 450 mm (18 in.) of the outside wall.

*Exception No. 1: A recreational vehicle equipped with only a listed flexible drain system or a side-vent drain system shall be permitted to have the electrical point of entrance located on either side, provided the drain(s) for the plumbing system is (are) located on the same side.*

*Exception No. 2: A recreational vehicle shall be permitted to have the electrical point of entrance located more than 4.5 m (15 ft) from the rear. Where this occurs, the distance beyond the 4.5-m (15-ft) dimension shall be added to the cord's minimum length as specified in 551.46(B).*

*Exception No. 3: Recreational vehicles designed for transporting livestock shall be permitted to have the electrical point of entrance located on either side or the front.*

## Statement of Problem and Substantiation for Public Input

Definition for power-supply assembly was changed in the 2023 edition to feeder assembly.

## Submitter Information Verification

**Submitter Full Name:** Curt Richardson  
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**Submittal Date:** Tue Aug 29 15:31:12 EDT 2023  
**Committee:** NEC-P07



## Public Input No. 1161-NFPA 70-2023 [ Section No. 551.47(A) ]

### (A) Wiring Systems.

Cables and raceways installed in accordance with ~~Articles 320 , 322 , 330 through 340 , 342 through 362 , 386 , and 388 shall be permitted in accordance with their applicable article~~ their respective articles shall be permitted , except as otherwise specified in this article. An equipment grounding means shall be provided in accordance with 250.118.

## Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the NEC® Style Manual prohibits referencing an entire article with the exception of Article 100 or where required for context. As such, it is recommended that we eliminate the references to the entire articles as shown to simplify the text without changing the meaning of the requirement. It would also be acceptable to convert this section to a list format but we should be referencing the parts of the article we're referring to or the specific section to comply with 4.1.4.

## Submitter Information Verification

**Submitter Full Name:** Richard Holub

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**Submittal Date:** Wed Jun 21 09:00:32 EDT 2023

**Committee:** NEC-P07





## Public Input No. 1775-NFPA 70-2023 [ Section No. 551.47(A) ]

### (A) Wiring Systems.

~~Cables and raceways installed in accordance with Articles 320, 322, 330 through 340, 342 through 362, 386, and 388 shall be permitted in accordance with their applicable article, except~~ Except ~~as otherwise specified in this article. An equipment grounding means shall be provided~~ , the wiring methods in 551.47(A)(1) through 551.47(A)(8) shall be permitted to be installed within a recreational vehicle. The wiring method shall include an equipment grounding conductor in accordance with 250.118.

- (1) Type AC
- (2) Type FC
- (3) Type MC
- (4) Type UF
- (5) Type IMC
- (6) Type ENT
- (7) Surface Metal Raceways
- (8) Surface Nonmetallic Raceways

### Statement of Problem and Substantiation for Public Input

551.47(A) was rewritten for clarity and usability. In addition, there are two NEC Style Manual issues:

- 3.5.2 Lists and Tables

If possible, lists or tables to present requirements shall be used, rather than long text descriptions

- 4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context.

### Submitter Information Verification

**Submitter Full Name:** Rudy Garza

**Organization:** IAEI

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**City:**

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**Submission Date:** Tue Aug 01 15:39:29 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1874-NFPA 70-2023 [ Section No. 551.47(N) ]

### (N) Moisture or Physical Damage.

Wiring shall be protected in accordance with the following:

- (1) Where outdoor or under-chassis line-voltage (120 volts, nominal, or higher) wiring is exposed, it shall be protected by a ~~conduit or~~ raceway identified for use in wet locations. The conductors shall be listed for use in wet locations.
- (2) Where wiring is exposed to physical damage, it shall be protected by a raceway.

### Statement of Problem and Substantiation for Public Input

The term "conduit or raceway" is redundant as all conduits are covered by the broader term of raceway. This change makes it clear that any raceway identified for use in wet locations is a permitted wiring method.

### Submitter Information Verification

**Submitter Full Name:** Don Ganiere

**Organization:** none

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**City:**

**State:**

**Zip:**

**Submittal Date:** Sun Aug 06 18:24:14 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2764-NFPA 70-2023 [ Section No. 551.47(P)(1) ]

### (1) Cord-and-Plug-Connected.

Cord-and-plug connections shall comply with 551.47(P)(1)(a) through (P)(1)(d).

(a) That portion of a branch circuit that is installed in an expandable unit shall be permitted to be connected to the portion of the branch circuit in the main body of the vehicle by means of an attachment plug and cord listed for hard usage. The cord and its connections shall comply with Article 400, Part I and Part II, as applicable, ~~of Article 400 and~~ and shall be considered as a permitted use under 400.10. Where the attachment plug and cord are located within the vehicle's interior, use of plastic thermoset or elastomer parallel cord Type SPT-3, SP-3, or SPE shall be permitted.

(b) Where the receptacle provided for connection of the cord to the main circuit is located on the outside of the vehicle, it shall be protected with a ground-fault circuit interrupter for personnel and be listed for wet locations. A cord located on the outside of a vehicle shall be identified for outdoor use.

(c) Unless removable or stored within the vehicle interior, the cord assembly shall have permanent provisions for protection against corrosion and mechanical damage while the vehicle is in transit.

(d) The attachment plug and cord shall be installed so as not to permit exposed live attachment plug pins.

## Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.

4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

## Submitter Information Verification

**Submitter Full Name:** David Williams

**Organization:** Delta Charter Township

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**City:**

**State:**

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**Submittal Date:** Thu Aug 24 20:19:26 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1549-NFPA 70-2023 [ Section No. 551.71(B) ]

(B) 30-Ampere.

~~A minimum of 70 percent of all recreational-~~ Recreational vehicle sites with electrical supply ~~shall each- should each~~ be equipped with a 30-ampere, 125-volt weather-resistant receptacle conforming to Figure 551.46(C)(1). This supply ~~shall be-~~ may be permitted to include additional receptacle configurations conforming to 551.81.- ~~The remainder of all recreational vehicle sites with electrical supply shall be equipped with one or more of the receptacle configurations conforming to 551.81 .~~

### Statement of Problem and Substantiation for Public Input

The requirement of "a minimum of 70 percent of all" is a design consideration for an RV park. It is my opinion the NEC should not dictate design parameters if a facility or installation meets all safety and over-current protection requirements.

### Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 1550-NFPA 70-2023 [Section No. 551.71(C)]</u>	

### Submitter Information Verification

**Submitter Full Name:** Jim Jordan

**Organization:** Southern Pine Electric

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Tue Jul 25 10:21:19 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1766-NFPA 70-2023 [ Section No. 551.71(B) ]

### (B) 30-Ampere.

A minimum of 70 percent of all recreational vehicle sites with electrical supply shall each be equipped with a 30-ampere, 125-volt weather-resistant receptacle conforming to Figure 551.46(C)(1). A 50-ampere receptacle to meet the requirements of 551.71(C) is permitted to be included. This supply shall be permitted to include additional receptacle configurations conforming to 551.81. The remainder of all recreational vehicle sites with electrical supply shall be equipped with one or more of the receptacle configurations conforming to 551.81.

### Statement of Problem and Substantiation for Public Input

Several times I have seen this section interpreted to mean that 70% of the sites have to have a 30-ampere receptacle, but an additional 20% (or 40%) must have a 50-ampere receptacle. Ex: If the RV park has 100 sites, 70 of them would need a 30-ampere receptacle. But then some people are saying that an additional and separate 20 (40) sites would need a 50-ampere receptacle. This doesn't work, as I only have 100 sites to start with, not 110.

### Submitter Information Verification

**Submitter Full Name:** Rudy Garza

**Organization:** IAEI

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Tue Aug 01 14:06:17 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1550-NFPA 70-2023 [ Section No. 551.71(C) ]

### (C) 50-Ampere.

A minimum of ~~20 percent of existing and 40 percent of all new~~ New recreational vehicle sites with electrical supply, ~~shall each~~ should each be equipped with a 50-ampere, 125/250-volt weather-resistant receptacle conforming to the configuration as identified in Figure 551.46(C)(1). Every recreational vehicle site equipped with a 50-ampere receptacle ~~shall also~~ should also be equipped with a 30-ampere, 125-volt receptacle conforming to Figure 551.46(C)(1). These electrical supplies ~~shall be~~ may be permitted to include additional receptacles that have configurations in accordance with 551.81. The weather-resistant requirement for 50-ampere, 125/250-volt receptacles shall become effective January 1, 2026.

~~Informational Note: The percentage of 50-ampere sites required by 551.71 could be inadequate for seasonal recreational vehicle sites serving a higher percentage of recreational vehicles with 50-ampere electrical systems. In that type of recreational vehicle park, the percentage of 50-ampere sites could approach 100 percent.~~

## Statement of Problem and Substantiation for Public Input

The requirement of "a minimum of 20 percent of existing and 40 percent of all" is a design consideration for an RV park. It is my opinion the NEC should not dictate design parameters if a facility or installation meets all safety and over-current protection requirements.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<a href="#">Public Input No. 1549-NFPA 70-2023 [Section No. 551.71(B)]</a>	Same reasoning.
<a href="#">Public Input No. 1551-NFPA 70-2023 [Section No. 551.71(D)]</a>	

## Submitter Information Verification

**Submitter Full Name:** Jim Jordan  
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**Street Address:**  
**City:**  
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**Submittal Date:** Tue Jul 25 10:23:38 EDT 2023  
**Committee:** NEC-P07



## Public Input No. 1551-NFPA 70-2023 [ Section No. 551.71(D) ]

### (D) Tent Sites.

Dedicated tent sites with a 15- or 20-ampere electrical supply shall ~~be permitted to be excluded when determining the percentage of recreational vehicle sites with 30- or 50-ampere receptacles.~~ meet the requirements of 551.71(F).

## Statement of Problem and Substantiation for Public Input

The RV park design criteria should be removed from this section and replaced with a GFCI requirement.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<a href="#">Public Input No. 1550-NFPA 70-2023 [Section No. 551.71(C)]</a>	RV park design reasoning.
<a href="#">Public Input No. 1552-NFPA 70-2023 [Section No. 551.71(E)]</a>	
<a href="#">Public Input No. 1553-NFPA 70-2023 [Section No. 551.72(F)]</a>	

## Submitter Information Verification

**Submitter Full Name:** Jim Jordan

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**City:**

**State:**

**Zip:**

**Submittal Date:** Tue Jul 25 10:26:08 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1552-NFPA 70-2023 [ Section No. 551.71(E) ]

### (E) Additional Receptacles.

Additional receptacles meeting 551.71(F) shall be permitted for the connection of electrical equipment outside the recreational vehicle within the recreational vehicle park.

## Statement of Problem and Substantiation for Public Input

Outdoor receptacles should be clearly stated to be GFCI.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 1551-NFPA 70-2023 [Section No. 551.71(D)]</u>	Same reasoning.

## Submitter Information Verification

**Submitter Full Name:** Jim Jordan

**Organization:** Southern Pine Electric

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**City:**

**State:**

**Zip:**

**Submittal Date:** Tue Jul 25 10:27:19 EDT 2023

**Committee:** NEC-P07





## Public Input No. 162-NFPA 70-2023 [ Section No. 551.71(F)(2) ]

### (2) Receptacles Installed in Recreational Vehicle Site Equipment.

Ground-fault circuit-interrupter protection shall only be required for 125-volt, single-phase, 15- and 20-ampere receptacles.

~~Informational Note No. 1: Appliances used within the recreational vehicle can create leakage current levels at the supply receptacle(s) that could exceed the limits of a Class A GFCI device.~~

~~Informational Note No. 2: The definition of *Feeder Assembly* clarifies that the power supply cord to a recreational vehicle is considered a feeder.~~

### Statement of Problem and Substantiation for Public Input

These 2 notes do not coincide with CMP-2 intent to GFCI protect all exterior receptacles, including those being 30 and 50 amp 250 and 125 volt on the exterior of areas other than RV parks. I submitted PI 161 to clarify GFCI protection of receptacles in other than RV parks. The scope of 551 only includes fixed wiring in RV parks to be modified from Chapter 1-4 rules. These notes add confusion about potential changes to 210.8 in PI-161.

### Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 161-NFPA 70-2023 [Section No. 210.8 [Excluding any Sub-Sections]]	GFCI protection by classifying fixed wiring prior to the RV cord as a branch circuit.

### Submitter Information Verification

**Submitter Full Name:** Matt Bednarik

**Organization:** State of Iowa

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Sat Jan 14 23:40:42 EST 2023

**Committee:** NEC-P07



## Public Input No. 2918-NFPA 70-2023 [ Section No. 551.72(B) ]

### (B)– Three    Poly -Phase Systems.

Feeders from 208Y/120-volt, 3- poly - phase systems shall be permitted to include two ungrounded conductors and shall include one grounded conductor and one equipment grounding conductor. So far as practicable, the loads shall be equally distributed on the 3 poly - phase system.

## Statement of Problem and Substantiation for Public Input

208Y/120 is not the only poly-phase system that could be used at an RV park. 240/120 Delta and 5 wire two phase are other systems that might have 3 wire 120/240 circuits derived to feed RV sites.

## Submitter Information Verification

**Submitter Full Name:** Stephen Schmiechen

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

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**Submittal Date:** Sun Aug 27 17:39:29 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1162-NFPA 70-2023 [ Section No. 551.72(D) ]

### (D) Neutral Conductors.

Neutral conductors shall be permitted to be reduced in size below the minimum required size of the ungrounded conductors for 240-volt, line-to-line, permanently connected loads only. The neutral conductors shall not be reduced in size below the size of the ungrounded conductors for the site distribution.

Informational Note: Due to the long circuit lengths typical in most recreational vehicle parks, feeder conductor sizes found in the ampacity tables of ~~Article 310~~ elsewhere in this Code could be inadequate to maintain the voltage regulation suggested in 215.2(A), Informational Note No. 2. Total circuit voltage drop is a sum of the voltage drops of each serial circuit segment, where the load for each segment is calculated using the load that segment sees and the demand factors shown in Table 551.73(A).

### Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the NEC® Style Manual prohibits referencing an entire article with the exception of Article 100 or where required for context. As such, it is recommended to delete the reference to Article 310 here and actually just point to "ampacity tables found elsewhere in this Code. This more generic reference is actually more correct in this instance because possible ampacity tables are found in Article 310, Article 315, or Annex B depending on the distribution voltages and installation conditions.

### Submitter Information Verification

**Submitter Full Name:** Richard Holub

**Organization:** The DuPont Company, Inc.

**Street Address:**

**City:**

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**Submittal Date:** Wed Jun 21 09:06:18 EDT 2023

**Committee:** NEC-P07

**Public Input No. 2047-NFPA 70-2023 [ Section No. 551.72(D) ]****(D) Neutral Conductors.**

~~Neutral conductors shall be~~

Feeder and branch circuit neutral conductors installed for recreational vehicle park distribution shall be sized in accordance with 551.72(D)(a) and 551.72(D)(b):

(a) Feeders and branch-circuits neutral conductors supplying permanently connected loads, ancillary structures or buildings shall be permitted to be reduced in size

~~below the minimum required size of the ungrounded conductors for 240-volt, line-to-line, permanently connected loads only. The neutral conductors~~

in accordance with 220.61.

(b) Feeders and branch-circuits supplying recreational site distribution shall not be reduced in size

~~below~~

smaller than the size of the ungrounded conductors

~~for the site distribution~~

.

Informational Note: Due to the long circuit lengths typical in most recreational vehicle parks, feeder conductor sizes found in the ampacity tables of Article 310 could be inadequate to maintain the voltage regulation suggested in 215.2(A), Informational Note No. 2. Total circuit voltage drop is a sum of the voltage drops of each serial circuit segment, where the load for each segment is calculated using the load that segment sees and the demand factors shown in Table 551.73(A).

**Statement of Problem and Substantiation for Public Input**

This public input is being submitted on behalf of the Minnesota Department of Labor and Industry. Currently, the Department's inspection staff includes 14-office/field staff, 12-state field inspectors, 2-virtual inspectors and 50 plus contract electrical inspectors that complete over 170,000 electrical inspections annually.

The proposed change clarifies how neutral conductors are sized at an RV park. The list format organizes the section into two distinct parts.

(a) Addresses the permanently connected equipment or ancillary structures that maybe located at an RV park where the neutral current is subtractive when using a 120/240 – volt, single phase distribution.

The (b) language is rewritten for usability and clarifies that the site distribution must always have the same size neutral as the ungrounded conductors because of the predominate use of 125-volt circuits in RV site distribution.

**Submitter Information Verification**

**Submitter Full Name:** Dean Hunter

**Organization:** Minnesota Department of Labor

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Aug 11 11:47:40 EDT 2023

**Committee:** NEC-P07



## Public Input No. 639-NFPA 70-2023 [ Section No. 551.72(E) ]

### ~~(E) – Connected Devices.~~

~~The use of listed surge protective devices shall be permitted.~~

~~Informational Note: Use of multiple autotransformers on the load side of RV pedestals, supplied by a single feeder, can result in increased current on the RV park or campground distribution system.~~

## Statement of Problem and Substantiation for Public Input

We don't need permission to use an SPD, and the Informational Note is non sequitur. Why are we talking about autotransformers in the SPD section?

## Submitter Information Verification

**Submitter Full Name:** Ryan Jackson

**Organization:** Self-employed

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Mon Apr 17 11:52:34 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1553-NFPA 70-2023 [ Section No. 551.72(F) ]

### (F) Connection to Recreational Vehicle Site Equipment.

Each recreational vehicle shall be powered by only one 30-ampere or one 50-ampere external power supply cord.

Informational Note: The requirement in 551.72(F) does not preclude the use of the 15- or 20-ampere receptacle convenience outlet on the recreational vehicle supply equipment when used to supply equipment outside the recreational vehicle .

### Statement of Problem and Substantiation for Public Input

Adding language so that additional cords are not allowed to used for supplying equipment inside the RV such as a supplemental air conditioner.

### Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 1551-NFPA 70-2023 [Section No. 551.71(D)]	GFCI convenience receptacle for supplying additional equipment

### Submitter Information Verification

**Submitter Full Name:** Jim Jordan  
**Organization:** Southern Pine Electric  
**Affiliation:** Cajun RV Park, Biloxi, MS  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Tue Jul 25 10:28:26 EDT 2023  
**Committee:** NEC-P07



## Public Input No. 3113-NFPA 70-2023 [ Section No. 551.73 ]

### **551.73**— Calculated Load.

#### **(A)**— Basis of Calculations.

Electrical services and feeders shall be calculated on the basis of not less than all of the following:

- (1) 12,000-volt-amperes per site equipped with 50-ampere, 208Y/120-volt or 120/240-volt supply facilities
- (2) 3600-volt-amperes per site equipped with both 20-ampere and 30-ampere supply facilities
- (3) 2400-volt-amperes per site equipped with only 20-ampere supply facilities
- (4) 600-volt-amperes per site equipped with only 20-ampere supply facilities that are dedicated to tent sites

The demand factors set forth in Table 551.73(A) shall be the minimum allowable demand factors that shall be permitted in calculating load for service and feeders. Where the electrical supply for a recreational vehicle site has more than one receptacle.

Where the electrical supply is in a location that serves two recreational vehicles, the equipment for both sites shall comply with 551.77, and the calculated load shall only be calculated for the two receptacles with the highest rating.

#### **(B)**— Demand Factors.

The demand factor for a given number of sites shall apply to all sites indicated. For example, 20 sites calculated at 45 percent of 3600-volt-amperes results in a permissible demand of 1620-volt-amperes per site or a total of 32,400-volt-amperes for 20 sites.

Informational Note: These demand factors may be inadequate in areas of extreme hot or cold temperature with loaded circuits for heating or air conditioning.

Table 551.73(A) Demand Factors for Site Feeders and Service-Entrance Conductors for Park Sites

Number of Recreational

Vehicle Sites Demand Factor

(%) 1 100 2 90 3 80 4 75 5 65 6 60 7–9 55 10–12 50 13–15 48 16–18 47 19–21 45 22–24 43 25–35 42 plus 41

Loads for other amenities such as, but not limited to, service buildings, recreational buildings, and swimming pools shall be calculated separately and then be added to the value calculated for the recreational vehicle sites where they are all supplied by a common service.

## Statement of Problem and Substantiation for Public Input

In the 2023 NEC a new Part VI for healthcare load calculation was added and a new Part VII for marina load calculation was to Article 220. Proposing to add new Part VII to Article 220 titled Recreational Vehicle Park Load Calculations. Submitting another public input for new section 220.130.

## Submitter Information Verification

**Submitter Full Name:** Mike Holt

**Organization:** Mike Holt Enterprises Inc



**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Tue Aug 29 12:28:19 EDT 2023

**Committee:** NEC-P07

**Public Input No. 638-NFPA 70-2023 [ Section No. 551.73(B) ]****(B) Demand Factors.**

The demand factor for a given number of sites shall apply to all sites indicated.

Informational Note 1: For example, 20 sites calculated at 45 percent of 3600 volt-amperes results in a permissible demand of 1620 volt-amperes per site or a total of 32,400 volt-amperes for 20 sites.

Informational Note 2: These demand factors may be inadequate in areas of extreme hot or cold temperature with loaded circuits for heating or air conditioning.

Table 551.73(A) Demand Factors for Site Feeders and Service-Entrance Conductors for Park Sites

<u>Number of Recreational</u>	<u>Demand Factor</u>
<u>Vehicle Sites</u>	<u>(%)</u>
1	100
2	90
3	80
4	75
5	65
6	60
7–9	55
10–12	50
13–15	48
16–18	47
19–21	45
22–24	43
25–35	42
36 plus	41

Loads for other amenities such as, but not limited to, service buildings, recreational buildings, and swimming pools shall be calculated separately and then be added to the value calculated for the recreational vehicle sites where they are all supplied by a common service.

**Statement of Problem and Substantiation for Public Input**

This language is explanatory and therefore needs to be in an Informational Note or Informative Annex, if it is worth retaining at all.

**Submitter Information Verification**

**Submitter Full Name:** Ryan Jackson

**Organization:** Self-employed

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**City:**

**State:**

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**Submittal Date:** Mon Apr 17 11:50:45 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1163-NFPA 70-2023 [ Section No. 551.74 ]

### **551.74** Overcurrent Protection.

Overcurrent protection shall be provided ~~in accordance with Article 240~~ as required elsewhere in this Code .

## Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the NEC® Style Manual prohibits referencing an entire article except Article 100 or where required for context. As such, it is recommended that we simply state "as required elsewhere in this Code" here in lieu of the reference to Article 240. In fact, this more generic reference may be more accurate because overcurrent protection could be in line with Article 240, or possibly in accordance with Article 430 for motor loads when applicable. This revision would correct this style manual problem and improve the usability of this section. Alternatively, as this section isn't specifically modifying another section of the code, it could also be deleted and 90.3 would apply, with no change in the overall requirement.

## Submitter Information Verification

**Submitter Full Name:** Richard Holub

**Organization:** The DuPont Company, Inc.

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**Submittal Date:** Wed Jun 21 09:23:32 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2430-NFPA 70-2023 [ Section No. 551.79 ]

### **551.79** Clearance for Overhead Conductors.

Open conductors of not over 1000 volts ac , 1500 volts dc,, nominal, shall have a vertical clearance of not less than 5.5 m (18 ft) and a horizontal clearance of not less than 900 mm (3 ft) in all areas subject to recreational vehicle movement. In all other areas, clearances shall conform to 235.360 and 235.361.

Informational Note: See 235.360 and 235.361, for clearances of conductors over 600 volts, nominal.

### Statement of Problem and Substantiation for Public Input

This Public Input is submitted on behalf of a Correlating Committee Task Group consisting of Robert Osborne (Chair), Paul Barnhart, Lou Grahor, Donny Cook, Scott Higgins, Mike Querry, Roger McDaniel, Dave Burns, Rod Belisle, Kevin Rogers, Tony Ricciuti, Paul Knapp, Paul Sullivan, George Smith, Eric Simmon, Kevin Arnold, Larry Wildermuth, and Kyle Krueger.

Requirements are revised to include the same voltage demarcation used in many places throughout the Code.

### Submitter Information Verification

**Submitter Full Name:** Robert Osborne

**Organization:** UL Solutions

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**Submittal Date:** Thu Aug 17 09:46:01 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1164-NFPA 70-2023 [ Section No. 551.80(B) ]

### (B) Protection Against Physical Damage.

Direct-buried conductors and cables entering or leaving a trench shall be protected by rigid metal conduit, intermediate metal conduit, electrical metallic tubing with supplementary corrosion protection, rigid polyvinyl chloride conduit (PVC), nonmetallic underground conduit with conductors (NUCC), high density polyethylene conduit (HDPE), reinforced thermosetting resin conduit (RTRC), liquidtight flexible nonmetallic conduit, liquidtight flexible metal conduit, or other approved raceways or enclosures. Where subject to physical damage, the conductors or cables shall be protected by rigid metal conduit, intermediate metal conduit, Schedule 80 PVC conduit, or RTRC listed for exposure to physical damage. All such protection shall extend at least 450 mm (18 in.) into the trench from finished grade.

Informational Note: See 300.5 and Article 340, Part II, for conductors or Type UF cable used underground or in direct burial in earth.

### Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the NEC® Style Manual prohibits referencing an entire article other than Article 100 or where required for context. As such, it is recommended that we point the user to Article 340, Part II as that would cover the uses permitted and uses not permitted, in this application, along with the bending radius and the ampacity. Other portions of this article are certainly applicable in accordance with 90.3 and alternatively, this reference to Article 340 could be deleted in the Informational Note without changing the actual requirements in place in the Code.

To improve usability of the code, this section could also be converted to list format with the allowable wiring methods simply included as part of a list, similar to 501.10, for instance.

### Submitter Information Verification

**Submitter Full Name:** Richard Holub

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**Street Address:**

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**Submittal Date:** Wed Jun 21 09:38:48 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1165-NFPA 70-2023 [ Section No. 552.1 ]

### 552.1 Scope.

~~The provisions of this article cover~~ This article covers the electrical conductors and equipment installed within or on park trailers not covered fully under Articles 550 and 551.

## Statement of Problem and Substantiation for Public Input

The phrase "the provisions of" is removed here in accordance with 4.1.3 of the NEC® Style Manual. Section 4.1.4 of the NEC® Style manual prohibits references to an entire article except Article 100 and where required for context. The references here to Articles 550 and 551 are left as is "for context" and no changes are recommended to that portion of the text.

## Submitter Information Verification

**Submitter Full Name:** Richard Holub

**Organization:** The DuPont Company, Inc.

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**State:**

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**Submittal Date:** Wed Jun 21 09:49:31 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2765-NFPA 70-2023 [ Section No. 552.4 ]

### 552.4 General Requirements.

A park trailer is intended for seasonal use. It is not intended as a permanent dwelling unit or for commercial uses such as banks, clinics, offices, or similar. Units designed for such purposes are classified as relocatable structures and are covered in Part II of Article 545, Part II.

## Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.

4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

## Submitter Information Verification

**Submitter Full Name:** David Williams

**Organization:** Delta Charter Township

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**Submission Date:** Thu Aug 24 20:20:27 EDT 2023

**Committee:** NEC-P07





## Public Input No. 1166-NFPA 70-2023 [ Section No. 552.5 ]

### 552.5 Labels.

Labels required by ~~Article 552 shall~~ this article shall be made of etched, metal-stamped, or embossed brass or stainless steel; plastic laminates not less than 0.13 mm (0.005 in.) thick; or anodized or alclad aluminum not less than 0.5 mm (0.020 in.) thick or the equivalent.

Informational Note: See ANSI Z535.4-2011, *Product Safety Signs and Labels*, for guidance on other label criteria used in the park trailer industry.

### Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the NEC® Style Manual prohibits reference to an entire article with the exception of Article 100 or where required for context. As such, it is recommended here that we change to "this article" to comply with the style manual and not change the meaning of the requirement.

### Submitter Information Verification

**Submitter Full Name:** Richard Holub

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**Submittal Date:** Wed Jun 21 09:57:19 EDT 2023

**Committee:** NEC-P07

**Public Input No. 240-NFPA 70-2023 [ Section No. 552.43(B) ]****(B) Power-Supply Cord.**

If the park trailer has a power-supply cord, it shall be permanently attached to the panelboard enclosure , or to a junction box permanently connected to the panelboard enclosure , with the free end terminating in a molded-on attachment plug cap.

Cords with adapters and pigtail ends, extension cords, and similar items shall not be attached to, or shipped with, a park trailer.

A suitable clamp or the equivalent shall be provided at the panelboard enclosure knockout to afford strain relief for the cord to prevent strain from being transmitted to the terminals when the power-supply cord is handled in its intended manner.

The cord shall be a listed type with 3-wire, 120-volt or 4-wire, 120/240-volt conductors, one of which shall be identified by a continuous green color or a continuous green color with one or more yellow stripes for use as the equipment grounding conductor.

**Statement of Problem and Substantiation for Public Input**

The term "enclosure" is needed to clarify the difference between the panelboard (busbars) itself and the panelboard ENCLOSURE.

**Related Public Inputs for This Document**

<u>Related Input</u>	<u>Relationship</u>
<a href="#">Public Input No. 239-NFPA 70-2023 [Section No. 550.10(B)]</a>	panelboard busbars vs panelboard enclosure
<a href="#">Public Input No. 238-NFPA 70-2023 [Section No. 408.5]</a>	panelboard busbars vs panelboard enclosure
<a href="#">Public Input No. 237-NFPA 70-2023 [Section No. 408.3(F)]</a>	panelboard busbars vs panelboard enclosure
<a href="#">Public Input No. 235-NFPA 70-2023 [Section No. 424.47]</a>	panelboard busbars vs panelboard enclosure
<a href="#">Public Input No. 241-NFPA 70-2023 [Section No. 250.32(D)]</a>	

**Submitter Information Verification**

**Submitter Full Name:** Russ Leblanc

**Organization:** Leblanc Consulting Services

**Street Address:**

**City:**

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**Submission Date:** Sat Jan 28 11:24:03 EST 2023

**Committee:** NEC-P07



## Public Input No. 1167-NFPA 70-2023 [ Section No. 552.43(C) ]

### (C) Mast Weatherhead or Raceway.

Where the calculated load exceeds 50 amperes or where a permanent feeder is used, the supply shall be by means of one of the following:

- (1) One mast weatherhead installation, installed in accordance with Article 230, Part II, containing four continuous, insulated, color-coded feeder conductors, one of which shall be an equipment grounding conductor
- (2) A rigid metal conduit, intermediate metal conduit, rigid polyvinyl chloride conduit, or other raceways identified for the location from the disconnecting means in the park trailer to the underside of the park trailer

## Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the NEC® Style Manual prohibits reference to an entire article with the exception of Article 100 or where required for context. In this specific text, it is recommended we point the user to Part II of Article 230 as that contains the overhead service conductor language, or alternatively to 230.28(B) as that's the specific section dealing with weatherheads.

## Submitter Information Verification

**Submitter Full Name:** Richard Holub

**Organization:** The DuPont Company, Inc.

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**Submittal Date:** Wed Jun 21 10:05:11 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1168-NFPA 70-2023 [ Section No. 552.46(B)(3) ]

### (3) General Appliances.

(including furnace, water heater, space heater, range, and central or room air conditioner, etc.) An individual branch circuit shall be permitted to supply any load for which it is rated. There shall be one or more circuits of adequate rating in accordance with 552.46(B)(3)(a) through (B)(3)(d).

Informational Note No. 1: See 210.11(C)(2) for laundry branch circuit.

Informational Note No. 2: See Article 440- ~~for~~ , Parts I through VI, for central air conditioning.

(a) The total rating of fixed appliances shall not exceed 50 percent of the circuit rating if lighting outlets, general-use receptacles, or both are also supplied.

(b) For fixed appliances with a motor(s) larger than  $\frac{1}{8}$  horsepower, the total calculated load shall be based on 125 percent of the largest motor plus the sum of the other loads. Where a branch circuit supplies continuous load(s) or any combination of continuous and noncontinuous loads, the branch-circuit conductor size shall be in accordance with 210.19(A).

(c) The rating of a single cord-and-plug-connected appliance supplied by other than an individual branch circuit shall not exceed 80 percent of the circuit rating.

(d) The rating of a range branch circuit shall be based on the range demand as specified for ranges in 552.47(B)(5).

## Statement of Problem and Substantiation for Public Input

Similar to Public Input 1153 to 550.12(D), Section 4.1.4 of the NEC® Style Manual prohibit referencing an entire article except Article 100 or where required for context. As such, referencing Parts I through VI of Article 440 incorporates the requirements for central air conditioning, while not referencing the room air conditioning requirements of Part VII.

## Submitter Information Verification

**Submitter Full Name:** Richard Holub

**Organization:** The DuPont Company, Inc.

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**Submittal Date:** Wed Jun 21 10:09:39 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2766-NFPA 70-2023 [ Section No. 552.48(O)(1) ]

### (1) Cord-and-Plug Connected.

Cord-and-plug connections shall comply with 552.48(O)(1)(a) through (O)(1)(d).

(a) The portion of a branch circuit that is installed in an expandable unit shall be permitted to be connected to the portion of the branch circuit in the main body of the vehicle by means of an attachment plug and cord listed for hard usage. The cord and its connections shall comply with Article 400, Parts I and II of Article 400 and II and shall be considered as a permitted use under 400.10. Where the attachment plug and cord are located within the park trailer's interior, use of plastic thermoset or elastomer parallel cord Type SPT-3, SP-3, or SPE shall be permitted.

(b) Where the receptacle provided for connection of the cord to the main circuit is located on the outside of the park trailer, it shall be protected with a ground-fault circuit interrupter for personnel and be listed for wet locations. A cord located on the outside of a park trailer shall be identified for outdoor use.

(c) Unless removable or stored within the park trailer interior, the cord assembly shall have permanent provisions for protection against corrosion and mechanical damage while the park trailer is in transit.

(d) The attachment plug and cord shall be installed so as not to permit exposed live attachment plug pins.

## Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.

4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

## Submitter Information Verification

**Submitter Full Name:** David Williams

**Organization:** Delta Charter Township

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**Submission Date:** Thu Aug 24 20:21:26 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1487-NFPA 70-2023 [ Article 555 ]

### **Article 555** ~~Marinas, Boatyards, Floating Buildings, and Commercial and Noncommercial Docking and Docking Facilities~~

#### **Part I.** General

##### **555.1** Scope.

This article covers the installation of wiring and equipment in the areas comprising fixed or floating piers, wharves, docks, floating buildings, and other areas in marinas, boatyards, boat basins, boathouses, yacht clubs, boat condominiums, docking facilities associated with one-family dwellings, two-family dwellings, multifamily dwellings, and residential condominiums; any multiple docking facility or similar occupancies; and facilities that are used, or intended for use, for the purpose of repair, berthing, launching, storage, or fueling of small craft and the moorage of floating buildings.

Informational Note No. 1: See NFPA 303-2016, *Fire Protection Standard for Marinas and Boatyards*, for additional information.

Informational Note No. 2: Where boats, floating buildings, docks, and similar structures are connected to an electrical source or a supply of electricity, hazardous voltages and currents may create serious safety concerns.

Informational Note No. 3: Text that is followed by a reference in brackets has been extracted from NFPA 303-2016, *Fire Protection Standard for Marinas and Boatyards*, and NFPA 307-2016, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*. Only editorial changes were made to the extracted text to make it consistent with this *Code*.

##### **555.3** Electrical Datum Plane Distances.

###### **(A)** Floating Piers.

The electrical datum plane for floating piers and boat landing stages that is (1) installed to permit rise and fall response to water level and without lateral movement, and (2) that are so equipped that piers and landing stages can rise to the datum plane established for 555.3(B) or (C), shall be a horizontal plane 762 mm (30 in.) above the water level at the floating pier or boat landing stage and a minimum of 305 mm (12 in.) above the level of the deck.

###### **(B)** Areas Subject to Tidal Fluctuations.

In land areas subject to tidal fluctuation, the electrical datum plane shall be a horizontal plane that is 606 mm (2 ft) above the highest tide level for the area occurring under normal circumstances, based on the highest high tide.

###### **(C)** Areas Not Subject to Tidal Fluctuations.

In land areas not subject to tidal fluctuation, the electrical datum plane shall be a horizontal plane that is 606 mm (2 ft) above the highest water level for the area occurring under normal circumstances.

##### **555.4** Location of Service Equipment.

The service equipment for a floating building, dock, or marina shall be located on land no closer than 1.5 m (5 ft) horizontally from and adjacent to the structure served, but not on or in the structure itself or any other floating structure. Service equipment shall be elevated a minimum of 300 mm (12 in.) above the electrical datum plane.

**555.5 Maximum Voltage.**

Pier power distribution systems shall not exceed 250 volts phase to phase. Pier power distribution systems, where qualified personnel service the equipment under engineering supervision, shall be permitted to exceed 250 volts but these systems shall not exceed 600 volts.

**555.6 Load Calculations for Service and Feeder Conductors.**

General lighting and other loads shall be calculated in accordance with Part III of Article 220, and, in addition, the demand factors set forth in 220.120 shall be permitted for each service and/or feeder circuit supplying receptacles that provide shore power for boats.

**555.7 Transformers.****(A) General.**

Transformers and enclosures shall be identified for wet locations. The bottom of transformer enclosures shall not be located below the electrical datum plane.

**(B) Replacements.**

Transformers and enclosures shall be identified for wet locations where replacements are made.

**555.8 Marine Hoists, Railways, Cranes, and Monorails.**

Motors and controls for marine hoists, railways, cranes, and monorails shall not be located below the electrical datum plane. Where it is necessary to provide electric power to a mobile crane or hoist in the yard and a trailing cable is utilized, it shall be a listed portable power cable rated for the conditions of use and be provided with an outer jacket of distinctive color for safety.

**555.10 Signage.**

Permanent safety signs shall be installed to give notice of electrical shock hazard risks to persons using or swimming near a docking facility, boatyard, or marina and shall comply with all of the following:

- (1) The signage shall comply with 110.21(B)(1) and be of sufficient durability to withstand the environment.
- (2) The signs shall be clearly visible from all approaches to a marina, docking facility, or boatyard facility.
- (3) The signs shall state "WARNING — POTENTIAL SHOCK HAZARD — ELECTRICAL CURRENTS MAY BE PRESENT IN THE WATER."

**555.11 Motor Fuel Dispensing Stations — Hazardous (Classified) Locations.**

Electrical wiring and equipment located at or serving motor fuel dispensing locations shall comply with Article 514 in addition to the requirements of this article.

**555.12 Repair Facilities — Hazardous (Classified) Locations.**

Electrical wiring and equipment located at facilities for the repair of marine craft containing flammable or combustible liquids or gases shall comply with Article 511 in addition to the requirements of this article.

**555.13 Bonding of Non-Current-Carrying Metal Parts.**

All metal parts in contact with the water, all metal piping, and all non-current-carrying metal parts that are likely to become energized and that are not connected to a branch circuit or feeder equipment grounding conductor, shall be connected to the grounding bus in the panelboard using solid copper conductors; insulated, covered, or bare; not smaller than 8 AWG. Connections to bonded parts shall be made in accordance with 250.8.

**555.14 Equipotential Planes and Bonding of Equipotential Planes.**

An equipotential plane shall be installed where required in this section to mitigate step and touch voltages at electrical equipment. The parts specified in this section shall be bonded together and to the electrical grounding system. The bonding conductor shall be solid copper conductors; insulated, covered, or bare; not smaller than 8 AWG.

**(A) Areas Requiring Equipotential Planes.**

Equipotential planes shall be installed adjacent to all outdoor service equipment or disconnecting means that control equipment in or on water where the following conditions exist:

- (1) Where the system voltage exceeds 250 volts to ground
- (2) Where the equipment is located within 3 m (10 ft) of the body of water

The equipotential plane shall include all metallic enclosures and controls that are likely to become energized and are accessible to personnel. The equipotential plane shall encompass the area around the equipment and shall extend from the area directly below the equipment out not less than 900 mm (36 in.) in all directions from which a person would be able to stand and come in contact with the equipment.

**(B) Areas Not Requiring Equipotential Planes.**

Equipotential planes shall not be required for the controlled utilization equipment on the docking facility or floating building supplied by the service equipment or disconnecting means.

**555.15 Replacement of Equipment.**

When modifications or replacements of electrical enclosures, devices, or wiring methods are necessary on a docking facility, they shall be required to comply with the requirements of this Code, and the installation shall require an inspection of the circuit. Existing equipment that has been damaged shall be identified, documented, and repaired by a qualified person to the minimum requirements of the edition of this Code to which it was originally installed.

Informational Note: NFPA 303-2021, *Fire Protection Standard for Marinas and Boatyards*, is a resource for guiding the electrical inspection of a marina.

**Part II. Marinas, Boatyards, and Docking Facilities**

**555.30 Electrical Equipment and Connections.**

**(A) General.**

All electrical components within electrical equipment (excluding wiring methods) and connections not intended for operation while submerged shall be located at least 305 mm (12 in.) above the deck of a fixed or floating structure, but not below the electrical datum plane. Conductor splices, within junction boxes identified for wet locations, utilizing sealed wire connector systems listed and identified for submersion shall be required for floating structures where located above the waterline but below the electrical datum plane.

**(B) Replacements.**

Replacement electrical connections shall be located at least 305 mm (12 in.) above the deck of a floating or fixed structure. Conductor splices, within junction boxes identified for wet locations, utilizing sealed wire connector systems listed and identified for submersion shall be required where located above the waterline but below the electrical datum plane.

**555.31 Electrical Equipment Enclosures.**

**(A) Securing and Supporting.**

Electrical equipment enclosures installed on piers above deck level shall be securely and substantially supported by structural members, independent of any conduit connected to them. If enclosures are not attached to mounting surfaces by means of external ears or lugs, the internal screw heads shall be sealed to prevent seepage of water through mounting holes.

**(B) Location.**

Electrical equipment enclosures on piers shall be located so as not to interfere with mooring lines.



**555.32** Circuit Breakers, Switches, Panelboards, and Marina Power Outlets.

Circuit breakers and switches installed in gasketed enclosures shall be arranged to permit required manual operation without exposing the interior of the enclosure. All such enclosures shall be arranged with a weep hole to discharge condensation.

**555.33** Receptacles.

Receptacles shall be mounted not less than 305 mm (12 in.) above the deck surface of the pier and not below the electrical datum plane on a fixed pier.

**(A)** Shore Power Receptacles.**(1)** Enclosures.

Receptacles intended to supply shore power to boats shall be enclosed in listed marina power outlets, enclosures listed for wet locations, or shall be installed in listed enclosures protected from the weather. The integrity of the assembly shall not be affected when the receptacles are in use with any type of booted or nonbooted attachment plug/cap inserted.

**(2)** Strain Relief.

Means shall be provided where necessary to reduce the strain on the plug and receptacle caused by the weight and catenary angle of the shore power cord.

**(3)** Branch Circuits.

Each single receptacle that supplies shore power to boats shall be supplied from a marina power outlet or panelboard by an individual branch circuit of the voltage class and rating corresponding to the rating of the receptacle.

Informational Note: Supplying receptacles at voltages other than the voltages marked on the receptacle may cause overheating or malfunctioning of connected equipment, for example, supplying single-phase, 120/240-volt, 3-wire loads from a 208Y/120-volt, 3-wire source.

**(4)** Ratings.

Shore power for boats shall be provided by single receptacles rated not less than 30 amperes.

Informational Note: See NFPA 303-2016, *Fire Protection Standard for Marinas and Boatyards*, for locking- and grounding-type receptacles for auxiliary power to boats.

(a) Receptacles rated 30 amperes and 50 amperes shall be of the locking and grounding type.

Informational Note: See ANSI/NEMA WD 6-2016, *Wiring Devices — Dimensional Specifications*, for various configurations and ratings of locking- and grounding-type receptacles and caps.

(b) Receptacles rated 60 amperes or higher shall be of the pin and sleeve type.

Informational Note: See ANSI/UL 1686, *UL Standard for Safety Pin and Sleeve Configurations*, for various configurations and ratings of pin and sleeve receptacles.

**(B)** Other Than Shore Power.

Receptacles other than those supplying shore power to boats shall be permitted to be enclosed in marina power outlets with the receptacles that provide shore power to boats, provided the receptacles are marked to clearly indicate that the receptacles are not to be used to supply power to boats.

**(C)** Replacement Receptacles.

The requirements in 555.33 shall apply to the replacement of marina receptacles.

**555.34** Wiring Methods and Installation.**(A)** Wiring Methods.

**(1) General.**

Wiring methods of Chapter 3 shall be permitted where identified for use in wet locations and shall contain a wire-type insulated equipment grounding conductor.

**(2) Portable Power Cables.**

Extra-hard usage cord and extra-hard usage portable power cables rated not less than 75°C (167°F) and 600 volts, listed for use in the environment within which it is installed, shall be permitted as follows:

- (1) As permanent wiring on the underside of piers (floating or fixed)
- (2) Where flexibility is necessary as on piers composed of floating sections

**(B) Installation.****(1) Overhead Wiring.**

Overhead wiring shall be installed to avoid possible contact with masts and other parts of boats being moved in the yard.

Conductors and cables shall be routed to avoid wiring closer than 6.0 m (20 ft) from the outer edge or any portion of the yard that can be used for moving vessels or stepping or unstepping masts.

**(2) Outdoor Branch Circuits and Feeders.**

Multiple feeders and branch circuits shall be permitted and clearances for overhead branch-circuit and feeder wiring in locations of the boatyard other than those described in 555.34(B)(1) shall be located not less than 5.49 m (18 ft) above grade. Only Part I of Article 225 shall apply to marina installations.

**(3) Portable Power Cables.**

(a) Where portable power cables are permitted by 555.34(A)(2), the installation shall comply with the following:

- (2) Cables shall be properly supported.
- (3) Cables shall be located on the underside of the pier.
- (4) Cables shall be securely fastened by nonmetallic clips to structural members other than the deck planking.
- (5) Cables shall not be installed where subject to physical damage.
- (6) Where cables pass through structural members, they shall be protected against chafing by a permanently installed oversized sleeve of nonmetallic material.

(g) Where portable power cables are used as permitted in 555.34(A)(2)(2), there shall be a junction box of corrosion-resistant construction with permanently installed terminal blocks on each pier section to which the feeders and feeder extensions are to be connected. A listed marina power outlet employing terminal blocks/bars shall be permitted in lieu of a junction box. Metal junction boxes and covers, and metal screws and parts that are exposed externally to the boxes, shall be of corrosion-resistant materials or protected by material resistant to corrosion.

**(4) Protection.**

Rigid metal conduit, intermediate metal conduit, reinforced thermosetting resin conduit (RTRC) listed for aboveground use, or rigid polyvinyl chloride (PVC) conduit suitable for the location shall be used to protect wiring to a point at least 2.5 m (8 ft) above docks, decks of piers, and landing stages. The conduit shall be connected to the enclosure by full standard threads or fittings listed for use in damp or wet locations, as applicable.

**555.35 Ground-Fault Protection of Equipment (GFPE) and Ground-Fault Circuit Interrupter.**

For other than floating buildings, ground-fault protection for docking facilities shall be provided in accordance with 555.35(A) through (D).

**(A) Feeder.**

Listed GFPE, rated not more than 100 milliamperes, shall be provided for feeders installed on docking facilities. Coordination with downstream GFPE shall be permitted at the feeder overcurrent protective device.

*Exception: Transformer secondary conductors of a separately derived system that do not exceed 3 m (10 ft) and are installed in a raceway shall be permitted to be installed without ground-fault protection.*

*This exception shall also apply to the supply terminals of the equipment supplied by the transformer secondary conductors.*

**(B) Branch-Circuits.**

**(1) Receptacles Providing Shore Power.**

Listed GFPE, rated not more than 30 milliamperes, shall be provided for receptacles installed in accordance with 555.33(A).

**(2) Outlets for Other than Shore Power.**

Outlets supplied by branch circuits not exceeding 150 volts to ground and 60 amperes, single phase, and 150 volts or less to ground, 100 amperes or less, three phase, shall be provided with GFCI protection for personnel.

*Exception to (B): Low-voltage circuits not requiring grounding, not exceeding the low-voltage contact limit and supplied by listed transformers or power supplies that comply with 680.23(A) (2) shall be permitted to be installed without ground-fault protection.*

**(C) Boat Hoists.**

GFCI protection for personnel shall be provided for outlets not exceeding 240 volts that supply a boat hoist installed at docking facilities. GFCI protected receptacles for other than shore power shall be permitted to supply boat hoists.

**(D) Leakage Current Measurement Device.**

Where more than three receptacles supply shore power to boats, a listed leakage current measurement device for use in marina applications shall be available and be used to determine leakage current from each boat that will utilize shore power. The listing requirement for the leakage current measurement device for use in marina applications shall become effective January 1, 2026.

Informational Note No. 1: Leakage current measurement will provide the capability to determine when an individual boat has defective wiring or other problems contributing to hazardous voltage and current. The use of a test device will allow the facility operator to identify a boat that is creating problems. In some cases a single boat could cause an upstream GFPE device protecting a feeder to operate even though multiple boats are supplied from the same feeder. The use of a test device will help the facility operator prevent a particular boat from contributing to hazardous voltage and current in the marina area.

Informational Note No. 2: An annual test of each boat with the leakage current measurement device is a prudent step toward determining if a boat has defective wiring that could be contributing hazardous voltage and current. Where the leakage current measurement device reveals that a boat is contributing hazardous voltage and current, repairs should be made to the boat before it is permitted to utilize shore power.

*Exception: Where the shore power equipment includes a leakage indicator and leakage alarm, a separate leakage test device shall not be required.*

**555.36 Disconnecting Means for Shore Power Connection(s).**

Disconnecting means shall be provided to isolate each boat from its supply connection(s).

**(A) Type.**

The disconnecting means shall consist of a circuit breaker, switch, or both, and shall be properly identified as to which receptacle it controls.

**(B) Location.**

The disconnecting means shall be readily accessible, located not more than 762 mm (30 in.) from the receptacle it controls, and located in the supply circuit ahead of the receptacle. Circuit breakers or switches located in marina power outlets complying with this section shall be permitted as the disconnecting means.

**(C) Emergency Electrical Disconnect.**

Each marina power outlet or enclosure that provides shore power to boats shall be provided with a listed emergency shutoff device or electrical disconnect that is clearly marked "Emergency Shutoff" in accordance with 110.22(A). The emergency shutoff device or electrical disconnect shall be within sight of the marina power outlet or other enclosure that provides shore power to boats, readily accessible, externally operable, manually resettable, and listed for use in wet locations. The emergency shutoff device or electrical disconnect shall de-energize the power supply to all circuits supplied by the marina power outlet(s) or enclosure(s) that provide shore power to boats. A circuit breaker handle shall not be used for this purpose.

**555.37 Equipment Grounding Conductor.****(A) Equipment to Be Connected to Equipment Grounding Conductor.**

The following items shall be connected to an equipment grounding conductor run with the circuit conductors in the same raceway, cable, or trench:

- (1) Metal boxes, metal cabinets, and all other metal enclosures
- (2) Metal frames of utilization equipment
- (3) Grounding terminals of grounding-type receptacles

**(B) Type of Equipment Grounding Conductor.**

An equipment grounding conductor shall be of the wire-type, insulated, and sized in accordance with 250.122 but not smaller than 12 AWG.

**(C) Feeder Equipment Grounding Conductor.**

Where a feeder supplies a remote panelboard or other distribution equipment, an insulated equipment grounding conductor shall extend from a grounding terminal in the service to a grounding terminal and busbar in the remote panelboard or other distribution equipment.

**(D) Branch-Circuit Equipment Grounding Conductor.**

The insulated equipment grounding conductor for branch circuits shall terminate at a grounding terminal in a remote panelboard, in other distribution equipment, or in the main service equipment.

**(E) Cord-and-Plug-Connected Appliances.**

Unless double-insulated, cord-and-plug-connected appliances shall be grounded by means of an equipment grounding conductor in the cord and a grounding-type attachment plug.

*Exception: An equipment grounding conductor shall be permitted to be uninsulated if a part of a listed cable assembly identified for the environment and not subject to atmospheres or environments such as, but not limited to, storm water basins, sewage treatment ponds, and natural bodies of water containing salt water.*

**555.38 Luminaires.****(A) General.**

All luminaires and retrofit kits shall be listed and identified for use in their intended environment. Luminaires and their supply connections shall be secured to structural elements of the marina to limit damage from watercraft and prevent entanglement of and interaction with sea life.

**(B) Underwater Luminaires.**

Luminaires installed below the highest high tide level or electrical datum plane and likely to be periodically submersed shall be limited to those luminaires that comply with the following:

- (1) Identified as submersible
- (2) Operate below the low-voltage contact limit defined in Article 100
- (3) Supplied by an isolating transformer or power supply in accordance with 680.23(A)(2)

**Part III. Floating Buildings****555.50 Service Conductors.**

One set of service conductors shall be permitted to serve more than one set of service equipment.

**555.51 Feeder Conductors.**

Each floating building shall be supplied by a single set of feeder conductors from its service equipment.

*Exception: Where the floating building has multiple occupancy, each occupant shall be permitted to be supplied by a single set of feeder conductors extended from the occupant's service equipment to the occupant's panelboard.*

**555.52 Installation of Services and Feeders.****(A) Flexibility.**

Flexibility of the wiring system shall be maintained between floating buildings and the supply conductors. All wiring shall be installed so that motion of the water surface and changes in the water level will not result in unsafe conditions.

**(B) Wiring Methods.**

Liquidtight flexible metal conduit or liquidtight flexible nonmetallic conduit with approved fittings shall be permitted for feeders and where flexible connections are required for services. Extra-hard usage portable power cable listed for both wet locations and sunlight resistance shall be permitted for a feeder to a floating building where flexibility is required. Other raceways suitable for the location shall be permitted to be installed where flexibility is not required.

**555.53 Ground-Fault Protection.**

The main overcurrent protective device that feeds the floating building shall have ground-fault protection not exceeding 100 mA. Ground-fault protection of each individual branch or feeder circuit shall be permitted as a suitable alternative. Outdoor outlets, shore power outlets, and boat hoists located at floating buildings shall comply with 555.35(B) and (C).

**555.54 Grounding.**

Grounding at floating buildings shall comply with 555.54(A) through (D).

**(A) Grounding of Electrical and Nonelectrical Parts.**

Grounding of both electrical and nonelectrical parts in a floating building shall be through connection to a grounding bus in the building panelboard.

**(B) Installation and Connection of Equipment Grounding Conductor.**

The equipment grounding conductor shall be installed with the feeder conductors and connected to a grounding terminal in the service equipment.

**(C) Identification of Equipment Grounding Conductor.**

The equipment grounding conductor shall be an insulated copper conductor with a continuous outer finish that is either green or green with one or more yellow stripes. For conductors larger than 6 AWG, or where multiconductor cables are used, re-identification of conductors allowed in 250.119(B)(2)b. and (B)(2)c. shall be permitted.

**(D) Grounding Electrode Conductor Connection.**

The grounding terminal in the service equipment shall be grounded by connection through an insulated grounding electrode conductor to a grounding electrode on shore.

**555.55 Insulated Neutral.**

The grounded circuit conductor (neutral) shall be an insulated conductor identified in compliance with 200.6. The neutral conductor shall be connected to the equipment grounding terminal in the service equipment, and, except for that connection, it shall be insulated from the equipment grounding conductors, equipment enclosures, and all other grounded parts. The neutral conductor terminals in the panelboard and in ranges, clothes dryers, counter-mounted cooking units, and the like shall be insulated from the enclosures.

**555.56 Equipment Grounding.****(A) Electrical Systems.**

All enclosures and exposed metal parts of electrical systems shall be connected to the grounding bus.

**(B) Cord-Connected Appliances.**

Where required to be grounded, cord-connected appliances shall be grounded by means of an equipment grounding conductor in the cord and a grounding-type attachment plug.

**Statement of Problem and Substantiation for Public Input**

This PI proposes to remove "Commercial and Noncommercial" from the title of the article. Terra appears to have underlined other text, but the only proposed change is to the title of the article. By stating "Docking Facilities" it captures both commercial and noncommercial. There are no specific "commercial" or "noncommercial" requirements in the article, thus the existing title adds no value, and can actually be confusing to users of the Code.

**Submitter Information Verification**

**Submitter Full Name:** Vincent Della Croce

**Organization:**

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jul 21 13:12:57 EDT 2023

**Committee:** NEC-P07





## Public Input No. 2240-NFPA 70-2023 [ Article 555 ]

### **Article 555** Marinas, Boatyards, Floating Buildings, and Commercial and Noncommercial Docking- Dwelling Docking\_ Facilities

#### **Part I.** General

##### **555.1** Scope.

This article covers the installation of wiring and equipment in the areas comprising fixed or floating piers, wharves, docks, floating buildings, and other areas in marinas, boatyards, boat basins, boathouses, yacht clubs, boat condominiums, docking facilities associated with one-family dwellings, two-family dwellings, multifamily dwellings, and residential condominiums; any multiple docking facility or similar occupancies; and facilities that are used, or intended for use, for the purpose of repair, berthing, launching, storage, or fueling of small craft and the moorage of floating buildings.

Informational Note No. 1: See NFPA 303-2016, *Fire Protection Standard for Marinas and Boatyards*, for additional information.

Informational Note No. 2: Where boats, floating buildings, docks, and similar structures are connected to an electrical source or a supply of electricity, hazardous voltages and currents may create serious safety concerns.

Informational Note No. 3: Text that is followed by a reference in brackets has been extracted from NFPA 303-2016, *Fire Protection Standard for Marinas and Boatyards*, and NFPA 307-2016, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*. Only editorial changes were made to the extracted text to make it consistent with this *Code*.

##### **555.3** Electrical Datum Plane Distances.

###### **(A)** Floating Piers.

The electrical datum plane for floating piers and boat landing stages that is (1) installed to permit rise and fall response to water level and without lateral movement, and (2) that are so equipped that piers and landing stages can rise to the datum plane established for 555.3(B) or (C), shall be a horizontal plane 762 mm (30 in.) above the water level at the floating pier or boat landing stage and a minimum of 305 mm (12 in.) above the level of the deck.

###### **(B)** Areas Subject to Tidal Fluctuations.

In land areas subject to tidal fluctuation, the electrical datum plane shall be a horizontal plane that is 606 mm (2 ft) above the highest tide level for the area occurring under normal circumstances, based on the highest high tide.

###### **(C)** Areas Not Subject to Tidal Fluctuations.

In land areas not subject to tidal fluctuation, the electrical datum plane shall be a horizontal plane that is 606 mm (2 ft) above the highest water level for the area occurring under normal circumstances.

##### **555.4** Location of Service Equipment.

The service equipment for a floating building, dock, or marina shall be located on land no closer than 1.5 m (5 ft) horizontally from and adjacent to the structure served, but not on or in the structure itself or any other floating structure. Service equipment shall be elevated a minimum of 300 mm (12 in.) above the electrical datum plane.

**555.5 Maximum Voltage.**

Pier power distribution systems shall not exceed 250 volts phase to phase. Pier power distribution systems, where qualified personnel service the equipment under engineering supervision, shall be permitted to exceed 250 volts but these systems shall not exceed 600 volts.

**555.6 Load Calculations for Service and Feeder Conductors.**

General lighting and other loads shall be calculated in accordance with Part III of Article 220, and, in addition, the demand factors set forth in 220.120 shall be permitted for each service and/or feeder circuit supplying receptacles that provide shore power for boats.

**555.7 Transformers.****(A) General.**

Transformers and enclosures shall be identified for wet locations. The bottom of transformer enclosures shall not be located below the electrical datum plane.

**(B) Replacements.**

Transformers and enclosures shall be identified for wet locations where replacements are made.

**555.8 Marine Hoists, Railways, Cranes, and Monorails.**

Motors and controls for marine hoists, railways, cranes, and monorails shall not be located below the electrical datum plane. Where it is necessary to provide electric power to a mobile crane or hoist in the yard and a trailing cable is utilized, it shall be a listed portable power cable rated for the conditions of use and be provided with an outer jacket of distinctive color for safety.

**555.10 Signage.**

Permanent safety signs shall be installed to give notice of electrical shock hazard risks to persons using or swimming near a docking facility, boatyard, or marina and shall comply with all of the following:

- (1) The signage shall comply with 110.21(B)(1) and be of sufficient durability to withstand the environment.
- (2) The signs shall be clearly visible from all approaches to a marina, docking facility, or boatyard facility.
- (3) The signs shall state "WARNING — POTENTIAL SHOCK HAZARD — ELECTRICAL CURRENTS MAY BE PRESENT IN THE WATER."

**555.11 Motor Fuel Dispensing Stations — Hazardous (Classified) Locations.**

Electrical wiring and equipment located at or serving motor fuel dispensing locations shall comply with Article 514 in addition to the requirements of this article.

**555.12 Repair Facilities — Hazardous (Classified) Locations.**

Electrical wiring and equipment located at facilities for the repair of marine craft containing flammable or combustible liquids or gases shall comply with Article 511 in addition to the requirements of this article.

**555.13 Bonding of Non-Current-Carrying Metal Parts.**

All metal parts in contact with the water, all metal piping, and all non-current-carrying metal parts that are likely to become energized and that are not connected to a branch circuit or feeder equipment grounding conductor, shall be connected to the grounding bus in the panelboard using solid copper conductors; insulated, covered, or bare; not smaller than 8 AWG. Connections to bonded parts shall be made in accordance with 250.8.

**555.14 Equipotential Planes and Bonding of Equipotential Planes.**



An equipotential plane shall be installed where required in this section to mitigate step and touch voltages at electrical equipment. The parts specified in this section shall be bonded together and to the electrical grounding system. The bonding conductor shall be solid copper conductors; insulated, covered, or bare; not smaller than 8 AWG.

**(A) Areas Requiring Equipotential Planes.**

Equipotential planes shall be installed adjacent to all outdoor service equipment or disconnecting means that control equipment in or on water where the following conditions exist:

- (1) Where the system voltage exceeds 250 volts to ground
- (2) Where the equipment is located within 3 m (10 ft) of the body of water

The equipotential plane shall include all metallic enclosures and controls that are likely to become energized and are accessible to personnel. The equipotential plane shall encompass the area around the equipment and shall extend from the area directly below the equipment out not less than 900 mm (36 in.) in all directions from which a person would be able to stand and come in contact with the equipment.

**(B) Areas Not Requiring Equipotential Planes.**

Equipotential planes shall not be required for the controlled utilization equipment on the docking facility or floating building supplied by the service equipment or disconnecting means.

**555.15 Replacement of Equipment.**

When modifications or replacements of electrical enclosures, devices, or wiring methods are necessary on a docking facility, they shall be required to comply with the requirements of this Code, and the installation shall require an inspection of the circuit. Existing equipment that has been damaged shall be identified, documented, and repaired by a qualified person to the minimum requirements of the edition of this Code to which it was originally installed.

Informational Note: NFPA 303-2021, *Fire Protection Standard for Marinas and Boatyards*, is a resource for guiding the electrical inspection of a marina.

**Part II. Marinas, Boatyards, and Docking Facilities**

**555.30 Electrical Equipment and Connections.**

**(A) General.**

All electrical components within electrical equipment (excluding wiring methods) and connections not intended for operation while submerged shall be located at least 305 mm (12 in.) above the deck of a fixed or floating structure, but not below the electrical datum plane. Conductor splices, within junction boxes identified for wet locations, utilizing sealed wire connector systems listed and identified for submersion shall be required for floating structures where located above the waterline but below the electrical datum plane.

**(B) Replacements.**

Replacement electrical connections shall be located at least 305 mm (12 in.) above the deck of a floating or fixed structure. Conductor splices, within junction boxes identified for wet locations, utilizing sealed wire connector systems listed and identified for submersion shall be required where located above the waterline but below the electrical datum plane.

**555.31 Electrical Equipment Enclosures.**

**(A) Securing and Supporting.**

Electrical equipment enclosures installed on piers above deck level shall be securely and substantially supported by structural members, independent of any conduit connected to them. If enclosures are not attached to mounting surfaces by means of external ears or lugs, the internal screw heads shall be sealed to prevent seepage of water through mounting holes.

**(B) Location.**

Electrical equipment enclosures on piers shall be located so as not to interfere with mooring lines.

**555.32** Circuit Breakers, Switches, Panelboards, and Marina Power Outlets.

Circuit breakers and switches installed in gasketed enclosures shall be arranged to permit required manual operation without exposing the interior of the enclosure. All such enclosures shall be arranged with a weep hole to discharge condensation.

**555.33** Receptacles.

Receptacles shall be mounted not less than 305 mm (12 in.) above the deck surface of the pier and not below the electrical datum plane on a fixed pier.

**(A)** Shore Power Receptacles.**(1)** Enclosures.

Receptacles intended to supply shore power to boats shall be enclosed in listed marina power outlets, enclosures listed for wet locations, or shall be installed in listed enclosures protected from the weather. The integrity of the assembly shall not be affected when the receptacles are in use with any type of booted or nonbooted attachment plug/cap inserted.

**(2)** Strain Relief.

Means shall be provided where necessary to reduce the strain on the plug and receptacle caused by the weight and catenary angle of the shore power cord.

**(3)** Branch Circuits.

Each single receptacle that supplies shore power to boats shall be supplied from a marina power outlet or panelboard by an individual branch circuit of the voltage class and rating corresponding to the rating of the receptacle.

Informational Note: Supplying receptacles at voltages other than the voltages marked on the receptacle may cause overheating or malfunctioning of connected equipment, for example, supplying single-phase, 120/240-volt, 3-wire loads from a 208Y/120-volt, 3-wire source.

**(4)** Ratings.

Shore power for boats shall be provided by single receptacles rated not less than 30 amperes.

Informational Note: See NFPA 303-2016, *Fire Protection Standard for Marinas and Boatyards*, for locking- and grounding-type receptacles for auxiliary power to boats.

(a) Receptacles rated 30 amperes and 50 amperes shall be of the locking and grounding type.

Informational Note: See ANSI/NEMA WD 6-2016, *Wiring Devices — Dimensional Specifications*, for various configurations and ratings of locking- and grounding-type receptacles and caps.

(b) Receptacles rated 60 amperes or higher shall be of the pin and sleeve type.

Informational Note: See ANSI/UL 1686, *UL Standard for Safety Pin and Sleeve Configurations*, for various configurations and ratings of pin and sleeve receptacles.

**(B)** Other Than Shore Power.

Receptacles other than those supplying shore power to boats shall be permitted to be enclosed in marina power outlets with the receptacles that provide shore power to boats, provided the receptacles are marked to clearly indicate that the receptacles are not to be used to supply power to boats.

**(C)** Replacement Receptacles.

The requirements in 555.33 shall apply to the replacement of marina receptacles.

**555.34** Wiring Methods and Installation.**(A)** Wiring Methods.

**(1) General.**

Wiring methods of Chapter 3 shall be permitted where identified for use in wet locations and shall contain a wire-type insulated equipment grounding conductor.

**(2) Portable Power Cables.**

Extra-hard usage cord and extra-hard usage portable power cables rated not less than 75°C (167°F) and 600 volts, listed for use in the environment within which it is installed, shall be permitted as follows:

- (1) As permanent wiring on the underside of piers (floating or fixed)
- (2) Where flexibility is necessary as on piers composed of floating sections

**(B) Installation.****(1) Overhead Wiring.**

Overhead wiring shall be installed to avoid possible contact with masts and other parts of boats being moved in the yard.

Conductors and cables shall be routed to avoid wiring closer than 6.0 m (20 ft) from the outer edge or any portion of the yard that can be used for moving vessels or stepping or unstepping masts.

**(2) Outdoor Branch Circuits and Feeders.**

Multiple feeders and branch circuits shall be permitted and clearances for overhead branch-circuit and feeder wiring in locations of the boatyard other than those described in 555.34(B)(1) shall be located not less than 5.49 m (18 ft) above grade. Only Part I of Article 225 shall apply to marina installations.

**(3) Portable Power Cables.**

(a) Where portable power cables are permitted by 555.34(A)(2), the installation shall comply with the following:

- (2) Cables shall be properly supported.
- (3) Cables shall be located on the underside of the pier.
- (4) Cables shall be securely fastened by nonmetallic clips to structural members other than the deck planking.
- (5) Cables shall not be installed where subject to physical damage.
- (6) Where cables pass through structural members, they shall be protected against chafing by a permanently installed oversized sleeve of nonmetallic material.

(g) Where portable power cables are used as permitted in 555.34(A)(2)(2), there shall be a junction box of corrosion-resistant construction with permanently installed terminal blocks on each pier section to which the feeders and feeder extensions are to be connected. A listed marina power outlet employing terminal blocks/bars shall be permitted in lieu of a junction box. Metal junction boxes and covers, and metal screws and parts that are exposed externally to the boxes, shall be of corrosion-resistant materials or protected by material resistant to corrosion.

**(4) Protection.**

Rigid metal conduit, intermediate metal conduit, reinforced thermosetting resin conduit (RTRC) listed for aboveground use, or rigid polyvinyl chloride (PVC) conduit suitable for the location shall be used to protect wiring to a point at least 2.5 m (8 ft) above docks, decks of piers, and landing stages. The conduit shall be connected to the enclosure by full standard threads or fittings listed for use in damp or wet locations, as applicable.

**555.35 Ground-Fault Protection of Equipment (GFPE) and Ground-Fault Circuit Interrupter.**

For other than floating buildings, ground-fault protection for docking facilities shall be provided in accordance with 555.35(A) through (D).

**(A) Feeder.**

Listed GFPE, rated not more than 100 milliamperes, shall be provided for feeders installed on docking facilities. Coordination with downstream GFPE shall be permitted at the feeder overcurrent protective device.

*Exception: Transformer secondary conductors of a separately derived system that do not exceed 3 m (10 ft) and are installed in a raceway shall be permitted to be installed without ground-fault protection.*

*This exception shall also apply to the supply terminals of the equipment supplied by the transformer secondary conductors.*

**(B) Branch-Circuits.**

**(1) Receptacles Providing Shore Power.**

Listed GFPE, rated not more than 30 milliamperes, shall be provided for receptacles installed in accordance with 555.33(A).

**(2) Outlets for Other than Shore Power.**

Outlets supplied by branch circuits not exceeding 150 volts to ground and 60 amperes, single phase, and 150 volts or less to ground, 100 amperes or less, three phase, shall be provided with GFCI protection for personnel.

*Exception to (B): Low-voltage circuits not requiring grounding, not exceeding the low-voltage contact limit and supplied by listed transformers or power supplies that comply with 680.23(A) (2) shall be permitted to be installed without ground-fault protection.*

**(C) Boat Hoists.**

GFCI protection for personnel shall be provided for outlets not exceeding 240 volts that supply a boat hoist installed at docking facilities. GFCI protected receptacles for other than shore power shall be permitted to supply boat hoists.

**(D) Leakage Current Measurement Device.**

Where more than three receptacles supply shore power to boats, a listed leakage current measurement device for use in marina applications shall be available and be used to determine leakage current from each boat that will utilize shore power. The listing requirement for the leakage current measurement device for use in marina applications shall become effective January 1, 2026.

Informational Note No. 1: Leakage current measurement will provide the capability to determine when an individual boat has defective wiring or other problems contributing to hazardous voltage and current. The use of a test device will allow the facility operator to identify a boat that is creating problems. In some cases a single boat could cause an upstream GFPE device protecting a feeder to operate even though multiple boats are supplied from the same feeder. The use of a test device will help the facility operator prevent a particular boat from contributing to hazardous voltage and current in the marina area.

Informational Note No. 2: An annual test of each boat with the leakage current measurement device is a prudent step toward determining if a boat has defective wiring that could be contributing hazardous voltage and current. Where the leakage current measurement device reveals that a boat is contributing hazardous voltage and current, repairs should be made to the boat before it is permitted to utilize shore power.

*Exception: Where the shore power equipment includes a leakage indicator and leakage alarm, a separate leakage test device shall not be required.*

**555.36 Disconnecting Means for Shore Power Connection(s).**

Disconnecting means shall be provided to isolate each boat from its supply connection(s).

**(A) Type.**

The disconnecting means shall consist of a circuit breaker, switch, or both, and shall be properly identified as to which receptacle it controls.

**(B) Location.**

The disconnecting means shall be readily accessible, located not more than 762 mm (30 in.) from the receptacle it controls, and located in the supply circuit ahead of the receptacle. Circuit breakers or switches located in marina power outlets complying with this section shall be permitted as the disconnecting means.

**(C) Emergency Electrical Disconnect.**

Each marina power outlet or enclosure that provides shore power to boats shall be provided with a listed emergency shutoff device or electrical disconnect that is clearly marked "Emergency Shutoff" in accordance with 110.22(A). The emergency shutoff device or electrical disconnect shall be within sight of the marina power outlet or other enclosure that provides shore power to boats, readily accessible, externally operable, manually resettable, and listed for use in wet locations. The emergency shutoff device or electrical disconnect shall de-energize the power supply to all circuits supplied by the marina power outlet(s) or enclosure(s) that provide shore power to boats. A circuit breaker handle shall not be used for this purpose.

**555.37 Equipment Grounding Conductor.****(A) Equipment to Be Connected to Equipment Grounding Conductor.**

The following items shall be connected to an equipment grounding conductor run with the circuit conductors in the same raceway, cable, or trench:

- (1) Metal boxes, metal cabinets, and all other metal enclosures
- (2) Metal frames of utilization equipment
- (3) Grounding terminals of grounding-type receptacles

**(B) Type of Equipment Grounding Conductor.**

An equipment grounding conductor shall be of the wire-type, insulated, and sized in accordance with 250.122 but not smaller than 12 AWG.

**(C) Feeder Equipment Grounding Conductor.**

Where a feeder supplies a remote panelboard or other distribution equipment, an insulated equipment grounding conductor shall extend from a grounding terminal in the service to a grounding terminal and busbar in the remote panelboard or other distribution equipment.

**(D) Branch-Circuit Equipment Grounding Conductor.**

The insulated equipment grounding conductor for branch circuits shall terminate at a grounding terminal in a remote panelboard, in other distribution equipment, or in the main service equipment.

**(E) Cord-and-Plug-Connected Appliances.**

Unless double-insulated, cord-and-plug-connected appliances shall be grounded by means of an equipment grounding conductor in the cord and a grounding-type attachment plug.

*Exception: An equipment grounding conductor shall be permitted to be uninsulated if a part of a listed cable assembly identified for the environment and not subject to atmospheres or environments such as, but not limited to, storm water basins, sewage treatment ponds, and natural bodies of water containing salt water.*

**555.38 Luminaires.****(A) General.**

All luminaires and retrofit kits shall be listed and identified for use in their intended environment. Luminaires and their supply connections shall be secured to structural elements of the marina to limit damage from watercraft and prevent entanglement of and interaction with sea life.

**(B) Underwater Luminaires.**

Luminaires installed below the highest high tide level or electrical datum plane and likely to be periodically submersed shall be limited to those luminaires that comply with the following:

- (1) Identified as submersible
- (2) Operate below the low-voltage contact limit defined in Article 100
- (3) Supplied by an isolating transformer or power supply in accordance with 680.23(A)(2)

**Part III. Floating Buildings****555.50 Service Conductors.**

One set of service conductors shall be permitted to serve more than one set of service equipment.

**555.51 Feeder Conductors.**

Each floating building shall be supplied by a single set of feeder conductors from its service equipment.

*Exception: Where the floating building has multiple occupancy, each occupant shall be permitted to be supplied by a single set of feeder conductors extended from the occupant's service equipment to the occupant's panelboard.*

**555.52 Installation of Services and Feeders.****(A) Flexibility.**

Flexibility of the wiring system shall be maintained between floating buildings and the supply conductors. All wiring shall be installed so that motion of the water surface and changes in the water level will not result in unsafe conditions.

**(B) Wiring Methods.**

Liquidtight flexible metal conduit or liquidtight flexible nonmetallic conduit with approved fittings shall be permitted for feeders and where flexible connections are required for services. Extra-hard usage portable power cable listed for both wet locations and sunlight resistance shall be permitted for a feeder to a floating building where flexibility is required. Other raceways suitable for the location shall be permitted to be installed where flexibility is not required.

**555.53 Ground-Fault Protection.**

The main overcurrent protective device that feeds the floating building shall have ground-fault protection not exceeding 100 mA. Ground-fault protection of each individual branch or feeder circuit shall be permitted as a suitable alternative. Outdoor outlets, shore power outlets, and boat hoists located at floating buildings shall comply with 555.35(B) and (C).

**555.54 Grounding.**

Grounding at floating buildings shall comply with 555.54(A) through (D).

**(A) Grounding of Electrical and Nonelectrical Parts.**

Grounding of both electrical and nonelectrical parts in a floating building shall be through connection to a grounding bus in the building panelboard.

**(B) Installation and Connection of Equipment Grounding Conductor.**

The equipment grounding conductor shall be installed with the feeder conductors and connected to a grounding terminal in the service equipment.

**(C) Identification of Equipment Grounding Conductor.**

The equipment grounding conductor shall be an insulated copper conductor with a continuous outer finish that is either green or green with one or more yellow stripes. For conductors larger than 6 AWG, or where multiconductor cables are used, re-identification of conductors allowed in 250.119(B)(2)b. and (B)(2)c. shall be permitted.



**(D) Grounding Electrode Conductor Connection.**

The grounding terminal in the service equipment shall be grounded by connection through an insulated grounding electrode conductor to a grounding electrode on shore.

**555.55 Insulated Neutral.**

The grounded circuit conductor (neutral) shall be an insulated conductor identified in compliance with 200.6. The neutral conductor shall be connected to the equipment grounding terminal in the service equipment, and, except for that connection, it shall be insulated from the equipment grounding conductors, equipment enclosures, and all other grounded parts. The neutral conductor terminals in the panelboard and in ranges, clothes dryers, counter-mounted cooking units, and the like shall be insulated from the enclosures.

**555.56 Equipment Grounding.****(A) Electrical Systems.**

All enclosures and exposed metal parts of electrical systems shall be connected to the grounding bus.

**(B) Cord-Connected Appliances.**

Where required to be grounded, cord-connected appliances shall be grounded by means of an equipment grounding conductor in the cord and a grounding-type attachment plug.

**Statement of Problem and Substantiation for Public Input**

Changing the title of Article 555 because 'Noncommercial' is a term not used anywhere else in the whole NEC and 'Dwelling' is a defined term. This title change to the Article will be helpful to Code users.

**Submitter Information Verification**

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**Submittal Date:** Tue Aug 15 13:10:46 EDT 2023

**Committee:** NEC-P07



## Public Input No. 3778-NFPA 70-2023 [ New Article after 555 ]

### **Relocate Article 555 to a stand-alone Chapter XX for Bodies of Water**

#### Statement of Problem and Substantiation for Public Input

Consider creating a separate Chapter within the NEC to cover the requirements for “Bodies of Water” (Refer to National Electrical Code® Correlating Committee White Paper: “Keeping the NEC® Relevant – Is Now the Time to Modernize?”).

Chapter XX Installations Associated with Bodies of Water

XX10 Swimming Pools, Fountains, and Similar Installations (Article 680)

XX12 Natural and Artificially Made Bodies of Water (Article 682)

XX14 Marinas, Boatyards, Floating Buildings, and Commercial and Noncommercial Docking Facilities (Article 555)

Enforcement of the NEC is conducted by many disciplines that can include electrical inspectors, consulting engineers, building officials and fire officials. By grouping "bodies of water" in one Chapter, it would encourage a more robust layout that will enhance the stability and usability for the next several decades and beyond.

#### Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<a href="#">Public Input No. 3620-NFPA 70-2023 [New Article after 680]</a>	Proposed relocation of Article 682
<a href="#">Public Input No. 3774-NFPA 70-2023 [New Article after 682]</a>	Proposed relocation of Article 680
<a href="#">Public Input No. 3620-NFPA 70-2023 [New Article after 680]</a>	
<a href="#">Public Input No. 3774-NFPA 70-2023 [New Article after 682]</a>	

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**Submittal Date:** Tue Sep 05 16:01:13 EDT 2023

**Committee:** NEC-P07





## Public Input No. 3925-NFPA 70-2023 [ Section No. 555.5 ]

### **555.5** Maximum Voltage.

Pier power distribution systems shall not exceed 250 volts phase to phase. Pier power distribution systems, where qualified personnel ~~service~~ install the equipment under engineering supervision, shall be permitted to exceed 250 volts but these systems shall not exceed 600 volts.

## Statement of Problem and Substantiation for Public Input

Per 90.2(C)(5), NFPA 70 is specifically for the electrical installation at locations that have shore power. Servicing of such installations would be covered under NFPA 303.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 3927-NFPA 70-2023 [Section No. 555.5]</u>	

## Submitter Information Verification

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**Submittal Date:** Wed Sep 06 10:36:18 EDT 2023  
**Committee:** NEC-P07



## Public Input No. 3927-NFPA 70-2023 [ Section No. 555.5 ]

### ~~555.5~~ – Maximum Voltage.

Pier

#### All pier power distribution systems shall

~~not exceed 250 volts phase to phase. Pier power distribution systems, where qualified personnel service the equipment~~

#### be installed by qualified personnel under engineering supervision,

~~shall be permitted to exceed 250 volts but these systems shall~~

#### and shall not exceed

~~600 volts~~

600 volts .

## Statement of Problem and Substantiation for Public Input

Most every recorded fatality resulting from electric shock drowning or electrocution has occurred at lower voltages (mostly at 120 volts). Review the below web link that lists known electric shock drowning incidents. The inherent dangers present at these facilities for pedestrians and boat owners are generally not from higher voltage distribution systems, but the voltages that are being directly utilized by the pedestrians. As such, if care is going to be given to these facilities such that engineering supervision is required, then the care must be applied where these electrical dangers are present and not simply focusing on higher voltages.

[https://www.electricshockdrowning.org/uploads/4/8/5/6/48564375/electric\\_shock\\_drowning\\_incident\\_list\\_5-3-23.pdf](https://www.electricshockdrowning.org/uploads/4/8/5/6/48564375/electric_shock_drowning_incident_list_5-3-23.pdf)

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 3925-NFPA 70-2023 [Section No. 555.5]	

## Submitter Information Verification

**Submitter Full Name:** Gary Loftis  
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**Submittal Date:** Wed Sep 06 10:40:01 EDT 2023  
**Committee:** NEC-P07



## Public Input No. 2767-NFPA 70-2023 [ Section No. 555.6 ]

### **555.6** Load Calculations for Service and Feeder Conductors.

General lighting and other loads shall be calculated in accordance with ~~Part III of~~ Article 220 , Part III,\_ and, in addition, the demand factors set forth in 220.120 shall be permitted for each service and/or feeder circuit supplying receptacles that provide shore power for boats.

## Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.

4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

## Submitter Information Verification

**Submitter Full Name:** David Williams

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**Submittal Date:** Thu Aug 24 20:22:20 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1476-NFPA 70-2023 [ Section No. 555.13 ]

### **555.13** Bonding of Non-Current-Carrying Metal Parts.

All metal parts in contact with the water, all metal piping, and all non-current-carrying metal parts that are likely to become energized and that are not connected to a branch circuit or feeder equipment grounding conductor, shall be connected to the grounding bus in the panelboard nearest the metal parts, metal piping or non-current carrying metal parts.

Connections shall be made using solid copper conductors; insulated, covered, or bare; not smaller than 8 AWG. Connections to bonded parts shall be made in accordance with 250.8.

### Statement of Problem and Substantiation for Public Input

This PI proposes to clarify what panelboard the connection is required to be made in. Currently there is no guidance provided. If there are multiple panelboards installed at or near metal parts, where is this connection required to be made?

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**Submittal Date:** Thu Jul 20 10:31:58 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2077-NFPA 70-2023 [ Section No. 555.13 ]

### **555.13** Bonding of Non-Current-Carrying Metal Parts.

All metal parts in contact with the water, all metal piping, and all non-current-carrying metal parts that are likely to become energized and that are not connected to a branch circuit or feeder equipment grounding conductor, shall be connected to the grounding bus in the enclosed panelboard using solid copper conductors; insulated, covered, or bare; not smaller than 8 AWG. Connections to bonded parts shall be made in accordance with 250.8.

### Statement of Problem and Substantiation for Public Input

The term 'panelboard' and 'enclosed panelboard' are defined terms. Adding the word 'enclosed panelboard' makes the text technically correct. Note: The term 'Enclosed Panelboard' was added to NEC Article 100 during the 2023 Code cycle.

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**Submittal Date:** Fri Aug 11 15:25:22 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2235-NFPA 70-2023 [ Section No. 555.13 ]

### **555.13** Bonding of Non-Current-Carrying Metal Parts.

All metal parts in contact with the water, all metal piping, and all non-current-carrying metal parts that are likely to become energized and that are not connected to a branch circuit or feeder equipment grounding conductor of the wire-type , shall be connected to the grounding bus in the panelboard using solid copper conductors; insulated, ~~covered, or bare~~; not smaller than 8 AWG. Connections to bonded parts shall be made in accordance with 250.8.

### Statement of Problem and Substantiation for Public Input

In marinas, boatyards, and docking facilities the equipment grounding conductor must be insulated and of the wire-type due to the corrosive conditions that could compromise the effective ground-fault current path of a metal raceway. This added language would bring clarity to that point and also match other requirements like 555.34(A)(1) and 555.37(B).

### Submitter Information Verification

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**Submittal Date:** Tue Aug 15 12:43:11 EDT 2023

**Committee:** NEC-P07



## Public Input No. 3258-NFPA 70-2023 [ Section No. 555.13 ]

### **555.13** Bonding of Non-Current-Carrying Metal Parts.

All metal parts ~~in contact with the water, all metal piping, and all non-current-carrying metal parts~~ that are likely to become energized ~~and that are not connected to a~~ shall be connected to one of the following:

- (1) The branch circuit or feeder equipment grounding conductor, ~~shall be connected to the conductor~~
- (2) The grounding bus in the panelboard using solid copper conductors; insulated, covered, or bare; not smaller than 8 AWG. Connections to bonded parts shall be made in accordance with 250.8.

### Statement of Problem and Substantiation for Public Input

The revised text makes it clear that all metal parts, regardless if they make contact with water or not, are required to be bonded if they are likely to become energized and not connected to an equipment grounding conductor. Additional text 'mirror' similar bonding requirements for metal piping systems in 250.104(B).

If the metal part that is likely to become energized is supplied with a circuit that contains an equipment grounding conductor, then there is no need to run a 8 AWG conductor.

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**Submittal Date:** Wed Aug 30 20:18:41 EDT 2023

**Committee:** NEC-P07



## Public Input No. 3924-NFPA 70-2023 [ Section No. 555.13 ]

### **555.13** Bonding of Non-Current-Carrying Metal Parts.

All metal parts in contact with the water, all metal piping, and all non-current-carrying metal parts that are likely to become energized and that are not connected to a branch circuit or feeder equipment grounding conductor, shall be connected to the grounding bus in the panelboard using solid copper conductors; insulated, covered, or bare; not smaller than 8 AWG. Connections to bonded parts shall be made in accordance with 250.8.

### Statement of Problem and Substantiation for Public Input

The facilities covered in this article are inherently susceptible to movement as part of its normal operation. As such, solid conductors are much more rigid and it is difficult for the conductors to maintain connection as movement persists. Allowing stranded conductors would allow more flexibility on a moving structure, especially regarding the routing of bonding conductors through hinge points and fifth-wheels. There is no inherent negative trait of allowing stranded conductors, so by requiring solid conductors and not permitting stranded, limits are placed on the overall longevity and reliability of the bonding conductors.

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**Submittal Date:** Wed Sep 06 10:33:54 EDT 2023

**Committee:** NEC-P07





## Public Input No. 3257-NFPA 70-2023 [ Section No. 555.14 ]

### **555.14 Equipotential Planes and Bonding of Equipotential Planes.**

An equipotential plane shall be installed where required in this section to mitigate step and touch voltages at electrical equipment. The parts specified in this section shall be bonded together and to the electrical grounding system. The bonding conductor shall be solid copper conductors; insulated, covered, or bare; not smaller than 8 AWG.

#### **(A) Areas Requiring**

##### Equipotential

##### Planes.

Equipotential planes shall be installed adjacent to all outdoor service equipment or disconnecting means that control equipment in or on water where

the following conditions exist: Where the

the system voltage exceeds 250 volts to ground

Where the

and the equipment is located within 3 m (10 ft) of the body of water .

#### **(A) Equipotential Plane Construction**

The equipotential plane shall include all metallic enclosures and controls that are likely to become energized and are accessible to personnel. The equipotential plane shall encompass the area around the outdoor service equipment and shall extend from the area directly below the equipment out not less than 900 mm (36 in.) in all directions from which a person would be able to stand and come in contact with the equipment. Bonding to equipotential planes shall be provided as specified in 555.14(A)(1) or (A)(2) and shall be attached to metallic enclosures that are likely to become energized with a solid copper, insulated, covered, or bare, and not smaller than 8 AWG.

(1) Structural Reinforcing Steel. Unencapsulated structural reinforcing steel bonded together by steel tie wires or the equivalent.

(2) Copper Grid. Copper grid where the following requirements are met:

(a) Be constructed of minimum 8 AWG bare solid copper conductors bonded to each other at all points of crossing in accordance with 250.8 or other approved means

(b) Be arranged in a 300 mm (12 in.) by 300 mm (12 in.) network of conductors in a uniformly spaced perpendicular grid pattern with a tolerance of 100 mm (4 in.)

(c) Only listed splicing devices or exothermic welding are used.

#### **(B) Areas Not Requiring Equipotential Planes.**

Equipotential planes shall not be required for the controlled utilization equipment on the docking facility or floating building supplied by the service equipment or disconnecting means.

## Statement of Problem and Substantiation for Public Input

The changes incorporates equipotential bonding requirements from 547.44 for agricultural building and 680.26 for swimming pools. Additional text provides the details on how the equipotential plane is to be constructed. Also text added to indicate how to bond the equipotential plane to the electrical system.

## Submitter Information Verification

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**Submittal Date:** Wed Aug 30 20:15:07 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1123-NFPA 70-2023 [ Section No. 555.15 ]

### **555.15** Replacement of Equipment.

When modifications or replacements of electrical enclosures, devices, or wiring methods are necessary on a docking facility, they shall be required to comply with the requirements of this *Code*, and the installation shall require an inspection of the circuit. Existing equipment that has been damaged shall be identified, documented, and repaired by a qualified person to the minimum requirements of ~~the edition of this *Code* to which it was originally installed~~ this code .

Informational Note: NFPA 303-2021, *Fire Protection Standard for Marinas and Boatyards*, is a resource for guiding the electrical inspection of a marina.

### Statement of Problem and Substantiation for Public Input

The language "the edition of this code to which it was originally installed" may be difficult to enforce as there may be no records of that code cycle or that edition of the code may not be readily available for reviewing.

### Submitter Information Verification

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**Committee:** NEC-P07



## Public Input No. 1774-NFPA 70-2023 [ Section No. 555.15 ]

### **555.15– 15 Servicing and** Replacement of Equipment.

When modifications or replacements of electrical enclosures, devices, or wiring methods are necessary on a docking facility, they shall be required to comply with the requirements of this *Code*, and the installation shall require an inspection of the circuit. Existing equipment that has been damaged shall be serviced or replaced in accordance with 555.15(A) or (B).

#### **(A) Servicing**

Equipment that has been damaged shall be identified, documented, and ~~repaired~~ serviced by a qualified person to meet or exceed the ~~minimum~~ requirements of the edition of this *Code* the code to which it was originally installed.

#### **(B) Replacement**

Equipment that has been damaged beyond servicing shall be documented and replaced by a qualified person.

Informational Note: NFPA 303-2021, *Fire Protection Standard for Marinas and Boatyards*, is a resource for guiding the electrical inspection of a marina.

## Statement of Problem and Substantiation for Public Input

The changes made add clarity through addressing the following areas: 1. The use of the word "repaired" is replaced with servicing. NEC 2023 introduced a new term servicing to avoid the confusion between that which is servicing and that which is reconditioning. There are specific requirements for servicing and reconditioning. The change here uses the proper term "servicing." 2.

The section is separated into two first level subdivisions for useability and in conformance with the NFPA NEC Style manual. (A) servicing leverages existing text and (B) Replacement provides guidance for when equipment is damaged beyond servicing.

## Submitter Information Verification

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**Submittal Date:** Tue Aug 01 15:26:45 EDT 2023

**Committee:** NEC-P07



## Public Input No. 1913-NFPA 70-2023 [ Section No. 555.15 ]

### **555.15– 39** \_ Replacement of Equipment.

When modifications or replacements of electrical enclosures, devices, or wiring methods are necessary on a docking facility, they shall be required to comply with the requirements of this *Code*, and the installation shall require an inspection of the circuit. Existing equipment that has been damaged shall be identified, documented, and repaired by a qualified person to the minimum requirements of the edition of this *Code* to which it was originally installed.

Informational Note: NFPA 303-2021, *Fire Protection Standard for Marinas and Boatyards*, is a resource for guiding the electrical inspection of a marina.

### Statement of Problem and Substantiation for Public Input

555.15 is in Part I of the article and as such would apply to Marinas, Boatyards, and Docking Facilities and to Floating Buildings, however the language in the section is specific to docking facilities. Since the rule is specific to docking facilities it belongs in Part II, not Part I.

If the panels intent is to have this rule also apply to floating buildings, you could delete the words docking facility and leave it as 555.15 in Part I.

### Submitter Information Verification

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**Submittal Date:** Mon Aug 07 15:02:52 EDT 2023

**Committee:** NEC-P07



## Public Input No. 362-NFPA 70-2023 [ Section No. 555.15 ]

### **555.15– 15 Servicing and** Replacement of Equipment.

When modifications or replacements of electrical enclosures, devices, or wiring methods are necessary on a docking facility, they shall be required to comply with the requirements of this *Code*, and the installation shall require an inspection of the circuit.

Existing equipment that has been damaged shall be serviced or replaced in accordance with 555.15(A) or (B).

#### **(A) Servicing**

Equipment that has been damaged shall be identified, documented, and ~~repaired~~ serviced by a qualified person to meet or exceed the ~~minimum~~ requirements of the edition of this *Code* to which it was originally installed.

#### **(B) Replacement**

Equipment that has been damaged beyond servicing shall be documented and replaced by a qualified person.

Informational Note: NFPA 303-2021, *Fire Protection Standard for Marinas and Boatyards*, is a resource for guiding the electrical inspection of a marina.

## Statement of Problem and Substantiation for Public Input

The changes made add clarity through addressing the following areas:

1. The use of the word "repaired" is replaced with servicing. NEC 2023 introduced a new term servicing to avoid the confusion between that which is servicing and that which is reconditioning. There are specific requirements for servicing and reconditioning. The change here uses the proper term "servicing."
2. The section is separated into two first level subdivisions for useability and in conformance with the NFPA NEC Style manual. (A) servicing leverages existing text and (B) Replacement provides guidance for when equipment is damaged beyond servicing.
- 3.

## Submitter Information Verification

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**Submittal Date:** Tue Feb 21 12:55:11 EST 2023

**Committee:** NEC-P07



## Public Input No. 548-NFPA 70-2023 [ Section No. 555.15 ]

### **555.15** Replacement of Equipment.

When modifications or replacements of electrical enclosures, devices, or wiring methods are necessary on a docking facility, they shall be required to comply with the requirements of this *Code*, and the installation shall require an inspection of the circuit. Existing equipment that has been damaged shall be ~~identified~~, documented, and repaired by a qualified person to the minimum requirements of the edition of this *Code* to which it was originally installed.

Informational Note: NFPA 303-2021, *Fire Protection Standard for Marinas and Boatyards*, is a resource for guiding the electrical inspection of a marina.

### Statement of Problem and Substantiation for Public Input

The word "identified" is defined in Article 100. It seems that the intent of this rule is not that existing equipment be identified (judged as suitable), but rather that it be acknowledged then documented and repaired. If the equipment is damaged it is certainly no longer "identified" (suitable for the application).

### Submitter Information Verification

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**Submittal Date:** Mon Apr 10 12:36:31 EDT 2023

**Committee:** NEC-P07

**Public Input No. 1586-NFPA 70-2023 [ Section No. 555.30 ]****555.30** Electrical Equipment and Connections.**(A)** General.

All electrical components within electrical equipment (excluding wiring methods) and connections not intended for operation while submerged shall be located at least 305 mm (12 in.) above the deck of a fixed or floating structure, but not below the electrical datum plane. Conductor splices, within junction boxes identified for wet locations, utilizing sealed wire connector systems listed and identified for submersion shall be required for floating structures where located above the waterline but below the electrical datum plane.

**(B)** Replacements.

Replacement electrical connections shall be located at least 305 mm (12 in.) above the deck of a floating or fixed structure. Conductor splices, within junction boxes identified for wet locations, utilizing sealed wire connector systems listed and identified for submersion shall be required where located above the waterline but below the electrical datum plane.

**Additional Proposed Changes**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
TIA_1659_70_23_5.pdf	NEC TIA 23-5 Log 1659	

**Statement of Problem and Substantiation for Public Input**

NOTE: This public input originates from Tentative Interim Amendment No. 23-5 (Log 1659) issued by the Standards Council on August 12, 2022 and per the NFPA Regs., needs to be reconsidered by the Code-Making Panel for the next edition of the Document.

Substantiation: This change adds language to ensure the proper portions of the electrical equipment are 12 inches above the deck of a fixed or floating structure and not below the electrical datum plane. The practice of ensuring this electrical components within switchboards or power pedestals is one that occurs at every one of these installations. Taken literally, each marina power outlet would have to be raised on a platform as these are electrical equipment. These and other products are and can be designed such that the electrical components within are raised 12 inches above the deck of a fixed or floating structure addressing the concerns of this requirement.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process.

Without implementing this change, this requirement would cause installations to raise all electrical equipment on platforms which could cause other safety concerns such as working space. Equipment such as power pedestals and other similar equipment are designed for these installations to address the 12" requirement. This change could cause problems with adoption and enforcement losing ground we have gained in safety for these applications.

**Submitter Information Verification**

**Submitter Full Name:** CMP ON NEC-P07

**Organization:** Code Making Panel 7

**Street Address:**

**City:**



**State:**

**Zip:**

**Submittal Date:** Wed Jul 26 13:41:45 EDT 2023

**Committee:** NEC-P07



Tentative Interim Amendment

**NFPA<sup>®</sup> 70<sup>®</sup>**

***National Electrical Code<sup>®</sup>***

**2023 Edition**

**Reference:** 555.30

**TIA 23-5**

*(SC 22-8-22 / TIA Log #1659)*

**Note:** Text of the TIA was issued and approved for incorporation into the document prior to printing.

*1. Revise paragraph 555.30 to read as follows:*

**555.30 Electrical Equipment and Connections.**

**(A) General.** All electrical components within electrical equipment (excluding wiring methods) and connections not intended for operation while submerged shall be located at least 305 mm (12 in.) above the deck of a fixed or floating structure, but not below the electrical datum plane. Conductor splices, within junction boxes identified for wet locations, utilizing sealed wire connector systems listed and identified for submersion shall be required for floating structures where located above the waterline but below the electrical datum plane.

**(B) Replacements. ...**

**Issue Date:** August 12, 2022

**Effective Date:** September 1, 2022

**(Note: For further information on NFPA Codes and Standards, please see [www.nfpa.org/docinfo](http://www.nfpa.org/docinfo))**

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## Public Input No. 4188-NFPA 70-2023 [ Section No. 555.30(A) ]

### (A) General.

(1) Location. All electrical components within electrical equipment (excluding wiring methods) and connections not intended for operation while submerged shall be located at least 305 mm (12 in.) above the deck of a fixed or floating structure, but not below the electrical datum plane.

(2) Wire Connector. Conductor splices, within junction boxes identified for wet locations, utilizing sealed wire connector systems listed and identified for submersion shall be required for floating structures where located above the waterline but below the electrical datum plane.

### Statement of Problem and Substantiation for Public Input

Breaking up 555.30(A) into a list item format to facilitate understanding for Code users. In accordance with NFPA Style Manual section 3.5.1.2 additional subdivisions shall be used where multiple requirements can be broken into independent requirements.

### Submitter Information Verification

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**Submittal Date:** Wed Sep 06 20:24:42 EDT 2023

**Committee:** NEC-P07



## Public Input No. 4190-NFPA 70-2023 [ Section No. 555.30(B) ]

### (B) Replacements.

(1) Location. Replacement electrical connections shall be located at least 305 mm (12 in.) above the deck of a floating or fixed structure.

(2) Wire Connector. Conductor splices, within junction boxes identified for wet locations, utilizing sealed wire connector systems listed and identified for submersion shall be required where located above the waterline but below the electrical datum plane.

### Statement of Problem and Substantiation for Public Input

Breaking up 555.30(B) into a list item format to facilitate understanding for Code users. In accordance with NFPA Style Manual section 3.5.1.2 additional subdivisions shall be used where multiple requirements can be broken into independent requirements.

### Submitter Information Verification

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**Submittal Date:** Wed Sep 06 20:30:44 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2768-NFPA 70-2023 [ Section No. 555.34(B)(2) ]

### (2) Outdoor Branch Circuits and Feeders.

Multiple feeders and branch circuits shall be permitted and clearances for overhead branch-circuit and feeder wiring in locations of the boatyard other than those described in 555.34(B)(1) shall be located not less than 5.49 m (18 ft) above grade. Only ~~Part I of Article 225 - shall -~~ , Part I shall apply to marina installations.

## Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.

4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

## Submitter Information Verification

**Submitter Full Name:** David Williams

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**Submittal Date:** Thu Aug 24 20:23:15 EDT 2023

**Committee:** NEC-P07

**Public Input No. 1587-NFPA 70-2023 [ Section No. 555.35 ]****555.35** Ground-Fault Protection of Equipment (GFPE) and Ground-Fault Circuit Interrupter.

For other than floating buildings, ground-fault protection for docking facilities shall be provided in accordance with 555.35(A) through (D).

**(A)** Feeder.

Listed GFPE, rated not more than 100 milliamperes, shall be provided for feeders installed on docking facilities. Coordination with downstream GFPE shall be permitted at the feeder overcurrent protective device.

*Exception: Transformer secondary conductors of a separately derived system that do not exceed 3 m (10 ft) and are installed in a raceway shall be permitted to be installed without ground-fault protection.*

*This exception shall also apply to the supply terminals of the equipment supplied by the transformer secondary conductors.*

**(B)** Branch-Circuits.**(1)** Receptacles Providing Shore Power.

Listed GFPE, rated not more than 30 milliamperes, shall be provided for receptacles installed in accordance with 555.33(A).

**(2)** Outlets for Other than Shore Power.

Outlets supplied by branch circuits not exceeding 150 volts to ground and 60 amperes, single phase, and 150 volts or less to ground, 100 amperes or less, three phase, shall be provided with GFCI protection for personnel.

*Exception to (B): Low-voltage circuits not requiring grounding, not exceeding the low-voltage contact limit and supplied by listed transformers or power supplies that comply with 680.23(A)(2) shall be permitted to be installed without ground-fault protection.*

**(C)** Boat Hoists.

GFCI protection for personnel shall be provided for outlets not exceeding 240 volts that supply a boat hoist installed at docking facilities. GFCI protected receptacles for other than shore power shall be permitted to supply boat hoists.

**(D) Leakage Current Measurement Device.**

Where more than three receptacles supply shore power to boats, a listed leakage current measurement device for use in marina applications shall be available and be used to determine leakage current from each boat that will utilize shore power. The listing requirement for the leakage current measurement device for use in marina applications shall become effective January 1, 2026.

Informational Note No. 1: Leakage current measurement will provide the capability to determine when an individual boat has defective wiring or other problems contributing to hazardous voltage and current. The use of a test device will allow the facility operator to identify a boat that is creating problems. In some cases a single boat could cause an upstream GFPE device protecting a feeder to operate even though multiple boats are supplied from the same feeder. The use of a test device will help the facility operator prevent a particular boat from contributing to hazardous voltage and current in the marina area.

Informational Note No. 2: An annual test of each boat with the leakage current measurement device is a prudent step toward determining if a boat has defective wiring that could be contributing hazardous voltage and current. Where the leakage current measurement device reveals that a boat is contributing hazardous voltage and current, repairs should be made to the boat before it is permitted to utilize shore power.

*Exception: Where the shore power equipment includes a leakage indicator and leakage alarm, a separate leakage test device shall not be required.*

**Additional Proposed Changes**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
TIA_1660_70_23_6.pdf	NEC TIA 23-6 Log 1660	

**Statement of Problem and Substantiation for Public Input**

NOTE: This public input originates from Tentative Interim Amendment No. 23-6 (Log 1660) issued by the Standards Council on August 12, 2022 and per the NFPA Regs., needs to be reconsidered by the Code-Making Panel for the next edition of the Document.

Substantiation: This change recognizes the difficulty of providing GFPE protection on sources that provide power to docking facilities. Removing (A) does not reduce the safety of the electrical system.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process. Changes in Article 555 have had a considerable impact on electrical safety for these applications. Without this change, technical challenges could lead to reduction of safety due to ignoring the GFPE or other requirements. Deleting (A) removes redundancy and will ensure proper adherence to the requirements and instills confidence in the language to the electrical professional.

**Submitter Information Verification**

**Submitter Full Name:** CMP ON NEC-P07  
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**Submittal Date:** Wed Jul 26 13:48:41 EDT 2023  
**Committee:** NEC-P07



Tentative Interim Amendment

## NFPA<sup>®</sup> 70<sup>®</sup>

### *National Electrical Code<sup>®</sup>*

#### 2023 Edition

**Reference:** 555.35

**TIA 23-6**

(SC 22-8-23 / TIA Log #1660)

**Note:** Text of the TIA was issued and approved for incorporation into the document prior to printing.

1. Revise paragraph 555.35 to read as follows:

**555.35 Ground-Fault Protection of Equipment (GFPE) and Ground-Fault Circuit Interrupter.** For other than floating buildings, ground-fault protection for docking facilities shall be provided in accordance with 555.35(A) through (FD).

~~(A) Sources Directly Supplying Docking Facilities or Wharfs.~~ Listed GFPE, rated not more than 100 milliamperes, shall be provided for sources directly supplying all docking facilities or wharfs. Coordination with downstream GFPE shall be permitted.

~~(BA) Feeder.~~ ...

*Exception: Transformer secondary conductors of a separately derived system that do not exceed 3 m (10 ft) and are installed in a raceway shall be permitted to be installed without ground-fault protection.*

*This exception shall also apply to the supply terminals of the equipment supplied by the transformer secondary conductors.*

~~(CB) Branch-Circuits.~~

**(1) Receptacles Providing Shore Power.** ...

**(2) Outlets for Other than Shore Power.** Outlets supplied by branch circuits not exceeding 150 volts to ground and 60 amperes, single phase, and 150 volts or less to ground, 100 amperes or less, three phase, shall be provided with GFCI protection for personnel.

*Exception to (CB): Low-voltage circuits not requiring grounding, not exceeding the low-voltage contact limit and supplied by listed transformers or power supplies that comply with 680.23(A)(2) shall be permitted to be installed without ground-fault protection.*

~~(DC) Boat Hoists.~~ ...

~~(ED) Leakage Current Measurement Device.~~ ...

Informational Note No. 1: ...

Informational Note No. 2: ...

*Exception: Where the shore power equipment includes a leakage indicator and leakage alarm, a separate leakage test device shall not be required.*

**Issue Date:** August 12, 2022

**Effective Date:** September 1, 2022

(Note: For further information on NFPA Codes and Standards, please see [www.nfpa.org/docinfo](http://www.nfpa.org/docinfo))

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**Public Input No. 4403-NFPA 70-2023 [ Section No. 555.35 ]**

**555.35** Equipment Ground-Fault Protection of Equipment (GFPE)- Protective Device (EGFPD), Grounding Monitor/Interrupter (GM/I) and Ground-Fault Circuit Interrupter.

For other than floating buildings, ground-fault protection for docking facilities shall be provided in accordance with 555.35(A) through (D).

**(A) Feeder.**

Listed ~~GFPE~~ EGFPD , rated not more than 100 milliamperes, shall be provided for feeders installed on docking facilities. ~~Coordination with downstream GFPE shall be permitted at the feeder overcurrent protective device~~ Feeders, rated 100 amperes and less, providing power to outlets for other than shore power shall also be provided with a listed GM/I. Coordination with downstream EGFPDs shall be permitted .

*Exception: Transformer secondary conductors of a separately derived system that do not exceed 3 m (10 ft) and are installed in a raceway shall be permitted to be installed without ground-fault protection.*

*This exception shall also apply to the supply terminals of the equipment supplied by the transformer secondary conductors.*

**(B) Branch-Circuits.**

**(1) Receptacles Providing Shore Power.**

Listed ~~GFPE~~ EGFPD , rated not more than 30 milliamperes, shall be provided for receptacles installed in accordance with 555.33(A).

**(2) Outlets for Other than Shore Power.**

Outlets supplied by branch circuits not exceeding 150 volts to ground and 60 amperes, single phase, and 150 volts or less to ground, 100 amperes or less, three phase, shall be provided with GFCI protection for personnel.

*Exception to (B): Low-voltage circuits not requiring grounding, not exceeding the low-voltage contact limit and supplied by listed transformers or power supplies that comply with 680.23(A) (2) shall be permitted to be installed without ground-fault protection.*

**(C) Boat Hoists.**

GFCI protection for personnel shall be provided for outlets not exceeding 240 volts that supply a boat hoist installed at docking facilities. GFCI protected receptacles for other than shore power shall be permitted to supply boat hoists.

**(D) Leakage Current Measurement Device.**

Where more than three receptacles supply shore power to boats, a listed leakage current measurement device for use in marina applications shall be available and be used to determine leakage current from each boat that will utilize shore power. The listing requirement for the leakage current measurement device for use in marina applications shall become effective January 1, 2026.

Informational Note No. 1: Leakage current measurement will provide the capability to determine when an individual boat has defective wiring or other problems contributing to hazardous voltage and current. The use of a test device will allow the facility operator to identify a boat that is creating problems. In some cases a single boat could cause an upstream GFPE device ~~EGFPD device~~ protecting a feeder to operate even though multiple boats are supplied from the same feeder. The use of a test device will help the facility operator prevent a particular boat from contributing to hazardous voltage and current in the marina area.

Informational Note No. 2: An annual test of each boat with the leakage current measurement device is a prudent step toward determining if a boat has defective wiring that could be contributing hazardous voltage and current. Where the leakage current measurement device reveals that a boat is contributing hazardous voltage and current, repairs should be made to the boat before it is permitted to utilize shore power.

*Exception: Where the shore power equipment includes a leakage indicator and leakage alarm, a separate leakage test device shall not be required.*

**Statement of Problem and Substantiation for Public Input**

As of the 2023 NEC, receptacles that are providing shore power are required to have listed GFPE protection that is rated not more than 30 mA.

The NEC's 2023 handbook reasons that the 30-milliamperere detection level was chosen for section 555.35 because "According to US Coast Guard studies and industry standards, 30 milliamperes represents an acceptable level to prevent a majority of electrical-shock drowning incidents while remaining practical enough to minimize unnecessary tripping".

GFPE devices are listed to UL 1053, which does not require the same minimum trip-time requirements as those specified in UL 943 and UL 943C for GFCIs. UL 1053 performance tests require certain operating times for 150 % and 250 % of the specified pickup level. However, these operating times do not include any added time delay, which is specified by the manufacturer for each set point.

For a GFPE device set to pick up at 30 mA of ground-fault current without any additional specified delays, the maximum trip time for a 45-milliamperere and a 75-milliamperere incident will be 2 s and 1 s, respectively. These durations are much longer than the trip times required for personnel protection under UL 943 and UL 943C, which equates to 312 ms and 152 ms, respectively, according to the UL 943 formula  $[(20/I)^{1.43}]$ .

The UL 943 formula was developed to clear faster than durations that cause the human heart to go into ventricular fibrillation. Additionally, GFPE clearing times are not equal to or faster than those of UL 943. Therefore, it is the authors' opinion that GFPE devices are not suitable for people protection from electric shock drowning incidents.

Personnel protection requires speed that GFPE devices are not tested or certified to. So if the intent is to protect humans from Electric Shock Drowning incidents, and the minimum pickup threshold needs to be raised to 30mA at the pedestal and 100mA at the feeder for compatibility with boats, then the speed at which those protective devices operate should still follow the personnel protection formula of UL 943.

EGFPDs are different devices than GFPE. While officially they cannot be considered personnel level protection, because of their adjustable settings, they are tested and certified to follow the personnel protection curve of UL 943.

Many of the incidents relating to shock, and ESD incidents in the marina environment are related to improper grounding (or lack thereof). The UL 943C Outline of Investigation for Special Purpose GFCIs has a requirement for Grounding Monitor/Interruption (GM/I) in applications where proper grounding is required by the NEC. There are already commercially available EGFPD products that are dual equipped with GM/I rated up to 100A. The GM/I feature does require an extra conductor to perform ground integrity, and would likely not be possible at the pedestal level as it would require

standardization of cords and plugs for each boat. However, this proactive technology could be implemented at the feeder level, to monitor the effective ground path between the distribution panel and each pedestal.

Informational Note 1:  
See UL Category FTTE, Equipment Ground-Fault Protective Devices, for further information. This product category is listed according to requirements in UL 1053, Standard for Ground-Fault Sensing and Relaying Equipment, and UL 943, Standard for Ground-Fault Circuit Interrupters.

Informational Note 2:  
See UL 943C, Outline of Investigation for Special Purpose Ground-Fault Circuit Interrupters, for information on Grounding Monitor/Interrupters.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<a href="#">Public Input No. 4440-NFPA 70-2023 [New Definition after Definition: Ground-Fault Circuit Inter...]</a>	New Definition
<a href="#">Public Input No. 4434-NFPA 70-2023 [New Definition after Definition: Ground-Fault Circuit Inter...]</a>	New Definition

Submitter Information Verification

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**Submittal Date:** Thu Sep 07 14:27:29 EDT 2023  
**Committee:** NEC-P07

**Public Input No. 4439-NFPA 70-2023 [ Section No. 555.35 ]****555.35** Ground-Fault Protection of Equipment (~~GFPE~~ Equipment Leakage Current Interrupter (ELCI) ) and Ground-Fault Circuit Interrupter.

For other than floating buildings, ground-fault protection for docking facilities shall be provided in accordance with 555.35(A) through (D).

**(A)** Feeder.

Listed ~~GFPE~~ ELCI , rated not more than 100 milliamperes, shall be provided for feeders installed on docking facilities. Coordination with downstream ~~GFPE~~- ELCI shall be permitted at the feeder overcurrent protective device.

*Exception: Transformer secondary conductors of a separately derived system that do not exceed 3 m (10 ft) and are installed in a raceway shall be permitted to be installed without ground-fault protection.*

*This exception shall also apply to the supply terminals of the equipment supplied by the transformer secondary conductors.*

**(B)** Branch-Circuits.**(1)** Receptacles Providing Shore Power.

Listed ~~GFPE~~ ELCI , rated not more than 30 milliamperes, shall be provided for receptacles installed in accordance with 555.33(A).

**(2)** Outlets for Other than Shore Power.

Outlets supplied by branch circuits not exceeding 150 volts to ground and 60 amperes, single phase, and 150 volts or less to ground, 100 amperes or less, three phase, shall be provided with ~~GFCI~~ ELCI protection for personnel.

*Exception to (B): Low-voltage circuits not requiring grounding, not exceeding the low-voltage contact limit and supplied by listed transformers or power supplies that comply with 680.23(A) (2) shall be permitted to be installed without ground-fault protection.*

**(C)** Boat Hoists.

GFCI protection for personnel shall be provided for outlets not exceeding 240 volts that supply a boat hoist installed at docking facilities. GFCI protected receptacles for other than shore power shall be permitted to supply boat hoists.

**(D) Leakage Current Measurement Device.**

Where more than three receptacles supply shore power to boats, a listed leakage current measurement device for use in marina applications shall be available and be used to determine leakage current from each boat that will utilize shore power. The listing requirement for the leakage current measurement device for use in marina applications shall become effective January 1, 2026.

Informational Note No. 1: Leakage current measurement will provide the capability to determine when an individual boat has defective wiring or other problems contributing to hazardous voltage and current. The use of a test device will allow the facility operator to identify a boat that is creating problems. In some cases a single boat could cause an upstream GFPE-ELCI device protecting a feeder to operate even though multiple boats are supplied from the same feeder. The use of a test device will help the facility operator prevent a particular boat from contributing to hazardous voltage and current in the marina area.

Informational Note No. 2: An annual test of each boat with the leakage current measurement device is a prudent step toward determining if a boat has defective wiring that could be contributing hazardous voltage and current. Where the leakage current measurement device reveals that a boat is contributing hazardous voltage and current, repairs should be made to the boat before it is permitted to utilize shore power.

*Exception: Where the shore power equipment includes a leakage indicator and leakage alarm, a separate leakage test device shall not be required.*

**Statement of Problem and Substantiation for Public Input**

GFPE devices, by definition, are installed to protect equipment from ground fault events. GFPE devices are required throughout the NEC and therefore the ELCI definition needs to remain in Article 100. However, GFPE is currently required in places such as Article 555 for marinas where it is utilized specifically to mitigate the shock hazard instead of equipment protection. Creating a new definition that can replace all instances of GFPE within Article 555 will help demonstrate the intent of the ground-fault requirements.

ELCI devices are already an industry standard, and they are recognized in such regulatory bodies as the ABYC (American Boat and Yacht Council). In ABYC's E11 standards, all boats are required to install an ELCI on the incoming main power with a trip level at a maximum of 30mA and trip time maximum of 100 ms.

The operating times required under UL 1053 Table 22.1 (listed below) for GFPE trip times are not adequate for protecting people in the marina environment.

115% of pickup, Trip time = "ultimately"

150% of pickup, Trip time = 2000ms

200% of pickup, Trip time = 1000ms

With the introduction and implementation of a new ELCI definition in Article 555.35, CMP-07 can define new trip time standards independent of the inadequate GFPE requirements for the marina environment.

**Related Public Inputs for This Document**

<u>Related Input</u>	<u>Relationship</u>
<a href="#">Public Input No. 3910-NFPA 70-2023 [Article 100]</a>	Both public inputs utilize the same substantiation.

**Submitter Information Verification**

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**Submittal Date:** Thu Sep 07 15:25:03 EDT 2023

**Committee:** NEC-P07



## Public Input No. 3913-NFPA 70-2023 [ Section No. 555.35(A) ]

### (A) Feeder.

Listed ~~GFPE~~ ELCI , rated not more than 100 milliamperes, shall be provided for feeders installed on docking facilities. Coordination with downstream ~~GFPE~~- ELCI shall be permitted at the feeder overcurrent protective device.

*Exception: Transformer secondary conductors of a separately derived system that do not exceed 3 m (10 ft) and are installed in a raceway shall be permitted to be installed without ground-fault protection.*

*This exception shall also apply to the supply terminals of the equipment supplied by the transformer secondary conductors.*

*Exception: The branch circuit feeding the ground fault monitoring device shall be permitted to be installed without ELCI where the circuit is installed in a raceway and where the branch circuit length is less than 10'.*

## Statement of Problem and Substantiation for Public Input

Currently, no exception exists for the branch circuits of ELCI equipment. As it stands strictly per code, the ELCI equipment itself would be susceptible of being de-energized during a ground fault event, thereby not protecting the facility. Having an exception for ELCI equipment branch circuits (with restrictions in place for the method of circuit installation) would ensure the ELCI system remains functional during and after ground fault events.

## Submitter Information Verification

**Submitter Full Name:** Gary Loftis

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**City:**

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**Zip:**

**Submittal Date:** Wed Sep 06 10:21:14 EDT 2023

**Committee:** NEC-P07



## Public Input No. 3915-NFPA 70-2023 [ Section No. 555.35(A) ]

### (A) Feeder.

Listed ~~GFPE~~ ELCI , rated not more than 100 milliamperes, shall be provided for feeders installed on docking facilities. Coordination with downstream ~~GFPE~~ ELCI shall be permitted at the feeder overcurrent protective device.

*Exception: ~~Transformer secondary conductors of a~~ The load side of separately derived system that systems that do not exceed 3 m (10 ft) and are installed in a raceway shall be permitted to be installed without ground-fault protection.*

*This exception shall also apply to the supply terminals of the equipment supplied by the transformer secondary conductors.*

### Statement of Problem and Substantiation for Public Input

When installing other separately derived systems such as battery inverters, generators, etc, the load side of these devices cannot currently meet the requirements of 555.35 (A). Including all separately derived systems and not just focusing on transformers, these additional devices can be utilized code-compliantly on piers to help provide state and local jurisdiction requirements such as emergency egress lighting.

### Submitter Information Verification

**Submitter Full Name:** Gary Loftis

**Organization:** Maffett Loftis Engineering, LLC

**Affiliation:** American Boat and Yacht Council

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**Submittal Date:** Wed Sep 06 10:24:08 EDT 2023

**Committee:** NEC-P07





## Public Input No. 3937-NFPA 70-2023 [ Section No. 555.35(A) ]

### (A) Feeder.

Listed ~~GFPE~~ ELCI , rated not more than 100 milliamperes, shall be provided for feeders installed on docking facilities. Coordination with downstream ~~GFPE~~- ELCI shall be permitted at the feeder overcurrent protective device.

*Exception: Transformer secondary conductors of a separately derived system that do not exceed 3 m (10 ft) and are installed in a raceway shall be permitted to be installed without ground-fault protection.*

*This exception shall also apply to the supply terminals of the equipment supplied by the transformer secondary conductors.*

*Exception: Feeders for fire pumps serving piers shall be permitted to utilize ground fault monitoring without disconnecting power to the pump circuit. The alarm shall be audio and visual. The ground fault monitor alarm shall notify upon ground faults exceeding 100mA. The alarm shall be located where it can be monitored by qualified marina personnel.*

## Statement of Problem and Substantiation for Public Input

Service equipment is required to be located on land. Therefore, the fire pump service equipment is required to be located on the land.

Currently, 555.35(A) requires the fire pump feeder to have ground fault protection, which is very much undesirable and is a life safety concern.

This results in a conflict between the requirements of service equipment locations, ground fault protection requirements, and the installation requirements for fire pumps in Article 695.

An exception for 555.4 regarding the location of the service equipment on piers for fire pumps introduces safety concerns that likely is not desired by the code-making panel

Therefore, an exception needs to be made to the ELCI requirements to allow for the specific installation of a fire pump feeder at a marina.

## Submitter Information Verification

**Submitter Full Name:** Gary Loftis

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**Affiliation:** American Boat and Yacht Council

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**Submittal Date:** Wed Sep 06 10:52:52 EDT 2023

**Committee:** NEC-P07



## Public Input No. 4066-NFPA 70-2023 [ New Section after 555.35(D) ]

### E. Coordination

The trip and time settings of the ELCI systems shall be coordinated.

### Statement of Problem and Substantiation for Public Input

With ELCI being required on all feeders and branch circuits throughout the marina facilities per 555.35, careful consideration needs to be given to how these interact with each other. 555.35(A) permits coordination with downstream ELCI at the feeder overcurrent protective devices. If coordination is not provided, a ground fault event at the receptacle location is likely to shut down the entire circuit and/or docking facility.

There have been many instances where uncoordinated systems have tripped upstream GFPE devices, resulting in the marina removing/disabling the GFPE that would otherwise be preventing the entire docking facility from losing power.

Maffett Loftis Engineering has witnessed multiple marinas in multiple states (MI, TN, KY, FL, etc.) where code-required GFPE devices have been disabled because of uncoordinated systems.

For further substantiation, life safety systems (such as those found in Article 517.31(G)) are required to be coordinated because of similar concerns.

### Submitter Information Verification

**Submitter Full Name:** Gary Loftis

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**Zip:**

**Submittal Date:** Wed Sep 06 15:30:53 EDT 2023

**Committee:** NEC-P07



## Public Input No. 4435-NFPA 70-2023 [ New Section after 555.35(D) ]

### **F. Commissioning**

All ELCI systems required by this code shall be commissioned by a licensed engineer or qualified person to ensure a code-compliant ground fault system is in place for all components. The timing of the ELCI systems shall be tested to verify the systems are coordinated per 555.35(E).

### **Statement of Problem and Substantiation for Public Input**

Currently, while GFPE/ELCI is required at locations covered under the scope of 555, there is no testing procedure in place to verify the operationality of such a GFPE/ELCI system. Local electrical inspectors do not have the equipment to adequately test and coordinate the ELCI devices. Both to ensure the functionality and code-compliance of the system and to ensure that all ELCI systems installed at the facility are properly coordinated for the best operation of the system, commissioning performed under engineering supervision should be required. This includes inducing leakage current locally to test the operation of the ELCI equipment, as well as verifying the timing and coordination of the ELCI systems.

Maffett Loftis Engineering (MLE) has found multiple safety issues with the GFPE systems after being approved by local electrical inspectors such as the GFPE devices tripping the wrong feeder upon a ground fault event. These issues have been found in marinas in MI, TX, ND, and FL. It is MLE's understanding that there is an ongoing lawsuit and investigation regarding a fatality at a marina as a result of this issue.

Another issue has been found where pushing the GFPE test button trips the GFPE device, but inducing leakage current up to the trip set level does not trip the GFPE device. Performance testing GFPE of large systems is already required in NEC 230.95(C). A part of this field testing is to inject leakage current to verify the device trips at the required level.

Article 555 needs to require this level of field testing for all feeder and shore power receptacle ELCI devices to ensure the systems work after installation for the protection of people.

### **Submitter Information Verification**

**Submitter Full Name:** Gary Loftis

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**Submittal Date:** Thu Sep 07 15:19:34 EDT 2023

**Committee:** NEC-P07



## Public Input No. 3161-NFPA 70-2023 [ Section No. 555.35(D) ]

### (D) Leakage Current Measurement Device.

Where more than three receptacles supply shore power to boats, a listed leakage current measurement device for use in marina applications shall be available and be used to determine leakage current from each boat that will utilize shore power. The listing requirement for the leakage current measurement device for use in marina applications shall become effective January 1, 2026.

Informational Note No. 1: Leakage current measurement will provide the capability to determine when an individual boat has defective wiring or other problems contributing to hazardous voltage and current. The use of a test device will allow the facility operator to identify a boat that is creating problems. In some cases a single boat could cause an upstream GFPE device protecting a feeder to operate even though multiple boats are supplied from the same feeder. The use of a test device will help the facility operator prevent a particular boat from contributing to hazardous voltage and current in the marina area.

Informational Note No. 2: An annual test of each boat with the leakage current measurement device is a prudent step toward determining if a boat has defective wiring that could be contributing hazardous voltage and current. Where the leakage current measurement device reveals that a boat is contributing hazardous voltage and current, repairs should be made to the boat before it is permitted to utilize shore power.

*Exception: Where the shore power equipment includes a leakage indicator and leakage alarm, a separate leakage test device shall not be required.*

### **Statement of Problem and Substantiation for Public Input**

555.35(D) The requirement for: "listed leakage current measurement device for use in marina applications shall be available and be used to determine leakage current", is beyond the scope of the NEC 555.1 document. While I am not at all opposed to the use of these devices in a marina, I question how the NEC committee intends for this requirement to be communicated and implemented.

If the NEC intends to regulate the operations of the marina, the marina operators and employees will need to be trained for the use of a leakage current measurement device. Additional and workable solutions will also need to be developed and added to their day to day operations regarding this requirement.

Boat builders, marine surveyors, marine service organizations and boat owners need to participate along with marina owners and operators in the elimination of the dangers of stray current into the water. The NEC should use its considerable presence to influence other marine industry stakeholders before reaching down directly to the owners, managers and employees of a marina. (eg: NFPA 303 will publish in 2025)

### **Statement of Problem and Substantiation for Public Input**

The requirement is beyond the scope in 555.1. Stay within the scope of the section or provide other workarounds to satisfy the intentions of this requirement.

### **Submitter Information Verification**

**Submitter Full Name:**

John McDevitt

**Organization:** Marine Safety and Fire Protection  
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**Submittal Date:** Tue Aug 29 20:24:01 EDT 2023  
**Committee:** NEC-P07



## Public Input No. 3172-NFPA 70-2023 [ Section No. 555.35(D) ]

### (D) Leakage Current Measurement Device.

Where more than three receptacles supply shore power to boats, a listed leakage current measurement device for use in marina applications shall be available and be used to determine leakage current from each boat that will utilize shore power. The listing requirement for the leakage current measurement device for use in marina applications shall become effective January 1, 2026.

Informational Note No. 1: Leakage current measurement will provide the capability to determine when an individual boat has defective wiring or other problems contributing to hazardous voltage and current. The use of a test device will allow the facility operator to identify a boat that is creating problems. In some cases a single boat could cause an upstream GFPE device protecting a feeder to operate even though multiple boats are supplied from the same feeder. The use of a test device will help the facility operator prevent a particular boat from contributing to hazardous voltage and current in the marina area.

Informational Note No. 2: An annual test of each boat with the leakage current measurement device is a prudent step toward determining if a boat has defective wiring that could be contributing hazardous voltage and current. Where the leakage current measurement device reveals that a boat is contributing hazardous voltage and current, repairs should be made to the boat before it is permitted to utilize shore power.

*Exception: Where the shore power equipment includes a leakage indicator and leakage alarm, a separate leakage test device shall not be required.*

*Exception: Where the shore power equipment includes a leakage indicator and leakage alarm, or GFPE equipment as required in Section 555.35, a separate leakage test device shall not be required.*

## Statement of Problem and Substantiation for Public Input

Large marinas do not have the human resources to perform these tests on a Saturday morning when a Yacht Club cruise arrives with 15 boats.

Marinas that have installed GFPE equipment in accordance with NEC 555 should not be required to perform leakage tests on vessels utilizing compliant with NEC 555.

## Submitter Information Verification

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**Committee:** NEC-P07



## Public Input No. 3920-NFPA 70-2023 [ Section No. 555.35 [Excluding any Sub-Sections] ]

~~For other than floating buildings, ground~~ Ground -fault protection for docking facilities shall be provided in accordance with 555.35(A) through (D).

### Statement of Problem and Substantiation for Public Input

Having “For other than floating buildings” included in the text is unnecessary and adds confusion when this article already specifies its scope is for “docking facilities”.

### Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 3922-NFPA 70-2023 [Section No. 555.35 [Excluding any Sub-Sections]]</u>	

### Submitter Information Verification

**Submitter Full Name:** Gary Loftis  
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**Submittal Date:** Wed Sep 06 10:30:17 EDT 2023  
**Committee:** NEC-P07



## Public Input No. 3922-NFPA 70-2023 [ Section No. 555.35 [Excluding any Sub-Sections] ]

For other than floating buildings, ground-fault ~~protection for docking facilities shall~~  
protection shall be provided in accordance with 555.35(A) through (D).

### Statement of Problem and Substantiation for Public Input

There are no inherent electrical properties to consider at docking facilities that are not also present at marinas, boatyards, etc. The electrical properties present themselves when specific types of power are provided for boats (shore power, other than shore power), which are laid out in (A) through (D). This phrase excludes the applicability of this code from other places where shore power might still be present. These other facilities should require the same approach as the code currently takes for docking facilities.

### Related Public Inputs for This Document

#### Related Input

Public Input No. 3920-NFPA 70-2023 [Section No. 555.35 [Excluding any Sub-Sections]]

#### Relationship

These two inputs work in conjunction to better clarify this code.

### Submitter Information Verification

**Submitter Full Name:** Gary Loftis

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**Submittal Date:** Wed Sep 06 10:31:04 EDT 2023

**Committee:** NEC-P07





## Public Input No. 4192-NFPA 70-2023 [ Section No. 555.36(C) ]

### (C) Emergency Electrical Disconnect.

(1) Marking. Each marina power outlet or enclosure that provides shore power to boats shall be provided with a listed emergency shutoff device or electrical disconnect that is clearly marked "Emergency Shutoff" in accordance with 110.22(A).

(2) Location. The emergency shutoff device or electrical disconnect shall be within sight of the marina power outlet or other enclosure that provides shore power to boats, readily accessible, externally operable, manually resettable, and listed for use in wet locations.

(3) Type. The emergency shutoff device or electrical disconnect shall de-energize the power supply to all circuits supplied by the marina power outlet(s) or enclosure(s) that provide shore power to boats. A circuit breaker handle shall not be used for this purpose.

### Statement of Problem and Substantiation for Public Input

Breaking up 555.36(C) into a list item format to facilitate understanding for Code users. In accordance with NFPA Style Manual section 3.5.1.2 additional subdivisions shall be used where multiple requirements can be broken into independent requirements.

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**Submission Date:** Wed Sep 06 20:33:58 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2403-NFPA 70-2023 [ Section No. 555.37(A) ]

(A) Equipment to Be Connected to Equipment Grounding Conductor.

The following items shall be connected to an insulated equipment grounding conductor of the wire-type run with the circuit conductors in the same raceway, cable, or trench:

- (1) Metal boxes, metal cabinets, and all other metal enclosures
- (2) Metal frames of utilization equipment
- (3) Grounding terminals of grounding-type receptacles

### Statement of Problem and Substantiation for Public Input

Adding 'wire-type insulated' to show Code users this is a technical modification of Chapters 1 through 4. In 555.37(B) it describes the equipment grounding conductor must be insulated and of the wire-type. Adding the language to 555.37(A) will emphasis this point.

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**Submittal Date:** Wed Aug 16 16:52:13 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2078-NFPA 70-2023 [ Section No. 555.37(C) ]

### (C) Feeder Equipment Grounding Conductor.

Where a feeder supplies a remote enclosed panelboard or other distribution equipment, an insulated equipment grounding conductor shall extend from a grounding terminal in the service to a grounding terminal and busbar in the remote enclosed panelboard or other distribution equipment.

### Statement of Problem and Substantiation for Public Input

The term 'panelboard' and 'enclosed panelboard' are defined terms. Adding the word 'enclosed panelboard' makes the text technically correct. Note: The term 'Enclosed Panelboard' was added to NEC Article 100 during the 2023 Code cycle.

### Submitter Information Verification

**Submitter Full Name:** Mike Holt

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**Submittal Date:** Fri Aug 11 15:26:42 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2509-NFPA 70-2023 [ Section No. 555.38(A) ]

### (A) General.

~~All luminaires and retrofit kits shall be listed and identified for use in their intended environment.~~

Luminaires and their supply connections shall be secured to structural elements of the marina to limit damage from watercraft and prevent entanglement of and interaction with sea life.

### Statement of Problem and Substantiation for Public Input

This language is already covered in 410.6 and 110.3(A). See 90.3 and 4.1.1 of the Style Manual.

### Submitter Information Verification

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**Submittal Date:** Fri Aug 18 13:38:41 EDT 2023

**Committee:** NEC-P07



## Public Input No. 4008-NFPA 70-2023 [ New Section after 555.50 ]

### 555.50 Applicability

Part III of this article shall apply to all piers other than docking facilities.

### Statement of Problem and Substantiation for Public Input

Adding 555.50 Applicability clears up confusion regarding Part III and other areas of 555 applying to docking facilities.

Subsequent sections would be required to be shifted down to allow for this new section to be placed first under Part III.

### Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 4007-NFPA 70-2023 [Part III.]</u>	Both relate to making more accurate/clear the purpose and scope of Part III

### Submitter Information Verification

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**Submittal Date:** Wed Sep 06 13:50:19 EDT 2023  
**Committee:** NEC-P07



## Public Input No. 4010-NFPA 70-2023 [ Section No. 555.51 ]

### **555.51** Feeder Conductors.

Each ~~floating building pier~~ shall be supplied by a single set of feeder conductors from its service equipment.

*Exception: Where the ~~floating building pier~~ has multiple occupancy, each occupant shall be permitted to be supplied by a single set of feeder conductors extended from the occupant's service equipment to the occupant's panelboard.*

## Statement of Problem and Substantiation for Public Input

"Piers", as defined in the NEC, is a more all-encompassing term for the various locations electrical systems can be installed on structures over bodies of water. There should be great care taken to ensure sections of the code are not so restrictive in their wording that there are holes in applicability for all areas of related safety concerns.

Fixed piers (i.e., "fixed buildings") over water are just as likely as producing electric shock hazards in water as floating buildings. Replacing "floating buildings" with "fixed and floating piers" removes this issue.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 4007-NFPA 70-2023 [Part III.]</u>	Both public inputs utilize the same substantiation.

## Submitter Information Verification

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**Submittal Date:** Wed Sep 06 13:56:43 EDT 2023  
**Committee:** NEC-P07



## Public Input No. 4011-NFPA 70-2023 [ Section No. 555.52(A) ]

### (A) Flexibility.

Flexibility of the wiring system shall be maintained between ~~floating buildings~~ piers and the supply conductors. All wiring shall be installed so that motion of the water surface and changes in the water level will not result in unsafe conditions.

## Statement of Problem and Substantiation for Public Input

“Piers”, as defined in the NEC, is a more all-encompassing term for the various locations electrical systems can be installed on structures over bodies of water. There should be great care taken to ensure sections of the code are not so restrictive in their wording that there are holes in applicability for all areas of related safety concerns.

Fixed piers (i.e., “fixed buildings”) over water are just as likely as producing electric shock hazards in water as floating buildings. Replacing “floating buildings” with “fixed and floating piers” removes this issue.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 4007-NFPA 70-2023 [Part III.]</u>	Both public inputs utilize the same substantiation.

## Submitter Information Verification

**Submitter Full Name:** Gary Loftis  
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**Submittal Date:** Wed Sep 06 13:59:37 EDT 2023  
**Committee:** NEC-P07



## Public Input No. 4012-NFPA 70-2023 [ Section No. 555.52(B) ]

### (B) Wiring Methods.

Liquidtight flexible metal conduit or liquidtight flexible nonmetallic conduit with approved fittings shall be permitted for feeders and where flexible connections are required for services. Extra-hard usage portable power cable listed for both wet locations and sunlight resistance shall be permitted for a feeder to a ~~floating building pier~~ where flexibility is required. Other raceways suitable for the location shall be permitted to be installed where flexibility is not required.

### Statement of Problem and Substantiation for Public Input

“Piers”, as defined in the NEC, is a more all-encompassing term for the various locations electrical systems can be installed on structures over bodies of water. There should be great care taken to ensure sections of the code are not so restrictive in their wording that there are holes in applicability for all areas of related safety concerns.

Fixed piers (i.e., “fixed buildings”) over water are just as likely as producing electric shock hazards in water as floating buildings. Replacing “floating buildings” with “fixed and floating piers” removes this issue.

### Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 4007-NFPA 70-2023 [Part III.]</u>	Both public inputs utilize the same substantiation.

### Submitter Information Verification

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**Submission Date:** Wed Sep 06 14:01:07 EDT 2023  
**Committee:** NEC-P07





## Public Input No. 4013-NFPA 70-2023 [ Section No. 555.53 ]

### **555.53** Ground-Fault Protection.

The main overcurrent protective device that feeds the ~~floating building~~ pier shall have ground-fault protection not exceeding 100 mA. Ground-fault protection of each individual branch or feeder circuit shall be permitted as a suitable alternative. Outdoor outlets, shore power outlets, and boat hoists located at ~~floating buildings~~ piers shall comply with 555.35(B) and (C).

## Statement of Problem and Substantiation for Public Input

“Piers”, as defined in the NEC, is a more all-encompassing term for the various locations electrical systems can be installed on structures over bodies of water. There should be great care taken to ensure sections of the code are not so restrictive in their wording that there are holes in applicability for all areas of related safety concerns.

Fixed piers (i.e., “fixed buildings”) over water are just as likely as producing electric shock hazards in water as floating buildings. Replacing “floating buildings” with “fixed and floating piers” removes this issue.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 4007-NFPA 70-2023 [Part III.]</u>	Both public inputs utilize the same substantiation.

## Submitter Information Verification

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**Submittal Date:** Wed Sep 06 14:02:19 EDT 2023  
**Committee:** NEC-P07



## Public Input No. 2079-NFPA 70-2023 [ Section No. 555.54(A) ]

### (A) Grounding of Electrical and Nonelectrical Parts.

Grounding of both electrical and nonelectrical parts in a floating building shall be through connection to a grounding bus in the building enclosed panelboard.

## Statement of Problem and Substantiation for Public Input

The term 'panelboard' and 'enclosed panelboard' are defined terms. Adding the word 'enclosed panelboard' makes the text technically correct. Note: The term 'Enclosed Panelboard' was added to NEC Article 100 during the 2023 Code cycle.

## Submitter Information Verification

**Submitter Full Name:** Mike Holt

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**Submittal Date:** Fri Aug 11 15:28:14 EDT 2023

**Committee:** NEC-P07



## Public Input No. 4021-NFPA 70-2023 [ Section No. 555.54(A) ]

### (A) Grounding of Electrical and Nonelectrical Parts.

Grounding of both electrical and nonelectrical parts in a ~~floating building~~ pier shall be through connection to a grounding bus in the building panelboard.

## Statement of Problem and Substantiation for Public Input

“Piers”, as defined in the NEC, is a more all-encompassing term for the various locations electrical systems can be installed on structures over bodies of water. There should be great care taken to ensure sections of the code are not so restrictive in their wording that there are holes in applicability for all areas of related safety concerns.

Fixed piers (i.e., “fixed buildings”) over water are just as likely as producing electric shock hazards in water as floating buildings. Replacing “floating buildings” with “fixed and floating piers” removes this issue.

## Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 4007-NFPA 70-2023 [Part III.]</u>	Both public inputs utilize the same substantiation.

## Submitter Information Verification

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**Submittal Date:** Wed Sep 06 14:13:32 EDT 2023  
**Committee:** NEC-P07



## Public Input No. 4015-NFPA 70-2023 [ Section No. 555.54 [Excluding any Sub-Sections] ]

Grounding at ~~floating buildings shall~~ piers shall comply with 555.54(A) through (D).

### Statement of Problem and Substantiation for Public Input

“Piers”, as defined in the NEC, is a more all-encompassing term for the various locations electrical systems can be installed on structures over bodies of water. There should be great care taken to ensure sections of the code are not so restrictive in their wording that there are holes in applicability for all areas of related safety concerns.

Fixed piers (i.e., “fixed buildings”) over water are just as likely as producing electric shock hazards in water as floating buildings. Replacing “floating buildings” with “fixed and floating piers” removes this issue.

### Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 4007-NFPA 70-2023 [Part III.]	Both public inputs utilize the same substantiation.

### Submitter Information Verification

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**Submittal Date:** Wed Sep 06 14:03:32 EDT 2023  
**Committee:** NEC-P07



## Public Input No. 4430-NFPA 70-2023 [ New Section after 555.56 ]

### Part IV Electric Vessels

#### Statement of Problem and Substantiation for Public Input

The electric vessel industry is expanding rapidly, with piers across the country looking to add infrastructure for electric vessels. With little consideration for electric vessels at piers within this code, there arises a multitude of electrical safety concerns that are otherwise addressed for fuel-driven vessels.

The NEC needs to address the installation of safe electric boat charging systems (both AC and DC charging). Many AC and DC charging systems have been installed for electric vessels across the US.

The American Boat and Yacht Council (ABYC) is in the process of developing standards to address charging systems on board electric vessels.

In order to fulfill the purpose of the NEC per 90.2, CMP07 needs to develop standards to address the installation requirements of electric vessel charging stations.

Some such standards would be:

555.70 Max DC Voltage

555.72 DC Charging Cords

555.76 Load Calculations

#### Submitter Information Verification

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**Submittal Date:** Thu Sep 07 15:14:07 EDT 2023

**Committee:** NEC-P07



## Public Input No. 4353-NFPA 70-2023 [ Section No. 604.10 ]

### **604.10** Uses Permitted.

Manufactured wiring systems shall be permitted in accessible and in dry locations as and in ducts, plenums, and other air-handling spaces where listed for this application and installed in accordance with 300.22.

*Exception No. 1: In concealed spaces, one end of tapped cable shall be permitted to extend into hollow walls for direct termination at switch and outlet points.*

*Exception No. 2: Manufactured wiring system assemblies installed outdoors shall be listed for use in outdoor locations.*

*Exception No. 3 : Manufactured wiring systems may be used in wet locations when listed for this application.*

### Statement of Problem and Substantiation for Public Input

There is a need for manufactured wiring in parking lots, garages etc.. that would be wet locations. If the product is listed for wet locations, there is no reason to limit its use to a dry location.

### Submitter Information Verification

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**Submittal Date:** Thu Sep 07 12:35:02 EDT 2023

**Committee:** NEC-P07



## Public Input No. 547-NFPA 70-2023 [ Section No. 604.100 ]

### 604.100 Construction.

#### (A) Cable, ~~Conduit,~~ and Tubing. Raceway Types.

##### (1) Cables.

Cable shall be listed Type AC cable or listed Type MC cable containing nominal 600-volt, 8 AWG to 12 AWG insulated copper-clad aluminum or copper conductors.

Other cables as ~~listed~~ indicated in 722.135, 800.113, and 830.179 shall be permitted in manufactured wiring systems for wiring of equipment within the scope of their respective articles.

##### (2) ~~Conduits and Tubing.~~

##### Conduit

**Raceways** shall be listed flexible metal conduit (FMC), listed ~~liquidtight flexible metal conduit (LFMC), ~~liquidtight flexible nonmetallic conduit (LFNC), or electrical metallic tubing (EMT) containing nominal 600-volt,~~~~

##### 8 AWG

##### 8 AWG to

##### 12 AWG

##### 12 AWG insulated copper-clad aluminum or copper conductors with

~~a bare or insulated copper~~

a copper-clad aluminum or copper equipment grounding conductor equivalent in size to the ungrounded

~~conductor~~

conductors.

*Exception No. 1 to (1) and (2): ~~A luminaire tap~~ Tap conductors for a luminaire, no longer than 1.8 m (6 ft) and intended for connection to a single luminaire, shall be permitted to contain conductors ~~be~~ smaller than 12 AWG but not smaller than 18 AWG.*

*Exception No. 2 to (1) and (2): Listed manufactured wiring assemblies containing conductors smaller than 12 AWG shall be permitted for remote-control, signaling, or communications circuits.*

*Exception No. 3 to (2): Listed manufactured wiring systems containing unlisted flexible metal conduit of noncircular cross section or trade sizes smaller than permitted by 348.20(A), or both, shall be permitted where the wiring systems are supplied with fittings and conductors at the time of manufacture.*

##### (3) Flexible Cord.

Flexible cord suitable for hard usage, with minimum 12 AWG conductors, shall be permitted as part of a listed factory-made assembly not exceeding 1.8 m (6 ft) in length when making a transition between components of a manufactured wiring system and utilization equipment not permanently secured to the building structure. The cord shall be visible for the entire length, shall not be subject to physical damage, and shall be provided with identified strain relief.

*Exception: ~~Listed Cords with conductors smaller than 12 AWG shall be permitted for listed electric-discharge luminaires that comply with 410.62(C) shall be permitted with conductors smaller than 12 AWG.~~*

**(4) Busways.**

Busways shall be listed continuous plug-in type containing factory-mounted, bare or insulated conductors, which shall be copper or aluminum bars, rods, or tubes. The busway shall be provided with an equipment ground grounding conductor . The busway shall be rated nominal 600 volts, 20, 30, or 40 amperes. Busways shall be installed in accordance with 368.12, 368.17(D), and 368.30.

**(5) Raceway Raceways .**

Prewired, modular, surface-mounted raceways shall be listed ~~for the use~~ , rated nominal 600 volts, 20 amperes, and installed in accordance with 386.12, 386.30, 386.60, and 386.100.

**(B) Marking.**

Each section shall be marked to identify the type of cable, flexible cord, or ~~conduit~~ raceway .

**(C) Receptacles and Connectors.**

Receptacles and connectors shall be of the locking type, uniquely polarized ~~and identified for the purpose~~ , and ~~shall be~~ part of a listed assembly for the appropriate system. All connector openings shall be designed to prevent inadvertent contact with live parts or capped to effectively close the connector openings.

**(D) Other Component Parts.**

Other component parts shall be listed for the appropriate system.

## Statement of Problem and Substantiation for Public Input

These revisions should be viewed as editorial in nature.

The title of (A) is revised to change conduit and tubing to raceway, as that is more accurate, especially with it (A)(5) in mind.

(A)(1) changes "listed" to "indicated" to avoid improper use of a defined term.

Although Terra has made it difficult to read, (A)(2) is revised to use the term "raceway" and to remove reference to "bare or insulated." Bare and insulated are not the only options, as a covered conductor should be permitted as well. There is no reason, however, to specifically mention all three options when mentioning none at all does the same thing.

Ex 1 is revised to address the subject (the tap conductors) instead of the practice (a tap).

(A)(3)'s exception is revised so the subject is the cord, not the luminaire. As currently written, the luminaire can have smaller conductors but the cord may not.

(4) is revised to use the correct and defined term "equipment grounding conductor."

(5) is revised to use the correct term in the title and to remove vague and unenforceable language (see 3.2.1 of the 2020 Style Manual).

(B) Is revised to use the word "raceway" instead of "conduit" to include EMT and other options.

(C) is revised to remove unnecessary and vague terminology. The word "identified" means that is is suitable for the purpose, so there is no reason to reiterate it. Additionally, "for the purpose" is a term that has been frowned on for decades and is included in the naughty list of 3.2.1 of the Style Manual.

## Submitter Information Verification

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**Committee:** NEC-P07





## Public Input No. 1513-NFPA 70-2023 [ Section No. 604.100(A)(2) ]

### (2) Conduits and Tubing.

~~Conduit shall be listed flexible metal conduit (FMC), listed liquidtight flexible metal conduit (LFMC), liquidtight flexible nonmetallic conduit (LFNC), or electrical metallic tubing (EMT) containing nominal~~ and tubing shall contain nominal 600-volt, 8 AWG to 12 AWG insulated copper-clad aluminum or copper conductors with a bare or insulated copper-clad aluminum or copper equipment grounding conductor equivalent in size to the ungrounded conductor - and shall be made of:

(a) listed flexible metal conduit (FMC)

(b) listed liquidtight flexible metal conduit (LFMC)

(c) liquidtight flexible nonmetallic conduit (LFNC)

(d) electrical metallic tubing (EMT)

*Exception No. 1 to (1) and (2): A luminaire tap, no longer than 1.8 m (6 ft) and intended for connection to a single luminaire, shall be permitted to contain conductors smaller than 12 AWG but not smaller than 18 AWG.*

*Exception No. 2 to (1) and (2): Listed manufactured wiring assemblies containing conductors smaller than 12 AWG shall be permitted for remote-control, signaling, or communications circuits.*

*Exception No. 3 to (2): Listed manufactured wiring systems containing unlisted flexible metal conduit of noncircular cross section or trade sizes smaller than permitted by 348.20(A), or both, shall be permitted where the wiring systems are supplied with fittings and conductors at the time of manufacture.*

## Statement of Problem and Substantiation for Public Input

Putting the raceways in list form will follow the NEC style Manuel and help with the ease of use of the code

## Submitter Information Verification

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**Submittal Date:** Sat Jul 22 14:41:50 EDT 2023

**Committee:** NEC-P07

**Public Input No. 668-NFPA 70-2023 [ Section No. 604.100(A)(3) ]****(3) Flexible Cord.**

Flexible cord suitable for hard usage, with minimum 12 AWG conductors, shall be permitted as part of a listed factory-made assembly not exceeding 1.8 m (6 ft) in length when making a transition between components of a manufactured wiring system and utilization equipment not permanently secured to the building structure. ~~The cord shall be visible for the entire length, shall not be subject to physical damage, and shall be provided with identified strain relief.~~

*Exception: Listed electric-discharge luminaires that comply with 410.62(C) shall be permitted with conductors smaller than 12 AWG.*

**Statement of Problem and Substantiation for Public Input**

Part II of Article 604 is for the construction of manufactured wiring systems, not their installation requirements. This language is an installation requirement that is already handled adequately in Article 400. It should be deleted altogether, or at least related to Part I.

**Submitter Information Verification**

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**Submittal Date:** Thu Apr 20 13:22:38 EDT 2023

**Committee:** NEC-P07



## Public Input No. 3276-NFPA 70-2023 [ Section No. 675.7 [Excluding any Sub-Sections] ]

Where intermittent duty is not involved, ~~Article~~ 430.6 shall be used for determining ratings for controllers, disconnecting means, conductors, and the like. Where irrigation machines have inherent intermittent duty, the determinations of equivalent current ratings in 675.7(A) and (B) shall be used.

### Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the NEC(r) Style Manual prohibits referencing an entire article except Article 100 or where required for context. In this case, the language about selection of motors, conductors, and other equipment associated all originates in this 430.6 section so it seems to me that would be a better reference here than the entire article. Not trying to change the requirement but attempting to refine the pointer in compliance with the Style Manual and improve usability of the Code.

### Submitter Information Verification

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**Committee:** NEC-P07



## Public Input No. 1312-NFPA 70-2023 [ Section No. 675.8(A) ]

### (A) Main Controller.

A controller that is used to start and stop the complete machine shall meet all of the following requirements:

- (1) An equivalent continuous current rating not less than specified in 675.7(A) or 675.22(A)
- (2) A horsepower rating not less than the value from Table 430.251(A)- and- , Table 430.251(B), or Table 430.251(C) based on the equivalent locked-rotor current specified in 675.7(B) or 675.22(B)

*Exception: A listed molded case switch shall not require a horsepower rating.*

## Statement of Problem and Substantiation for Public Input

This Public Input is a companion to the NEMA Public Input proposing to add new Table 430.251(C).

## Submitter Information Verification

**Submitter Full Name:** Megan Hayes

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**Submittal Date:** Fri Jul 07 17:28:58 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2925-NFPA 70-2023 [ Section No. 675.16 ]

### **675.16** Energy from More Than One Source.

Equipment within an enclosure receiving electric energy from more than one source shall not be required to have a disconnecting means for the additional source if its voltage is 30 volts or less and it meets the requirements of ~~Part II of Article 725~~ , Part II .

## Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.

4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

## Submitter Information Verification

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**Submittal Date:** Mon Aug 28 12:13:54 EDT 2023

**Committee:** NEC-P07



## Public Input No. 2926-NFPA 70-2023 [ Section No. 675.17 ]

### **675.17** Connectors.

External plugs and connectors on the equipment shall be of the weatherproof type.

Unless provided solely for the connection of circuits meeting the requirements of ~~Part II of Article 725~~ , Part II, external plugs and connectors shall be constructed as specified in 250.124(A).

### Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.

4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.

The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

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**Submittal Date:** Mon Aug 28 12:14:37 EDT 2023

**Committee:** NEC-P07



## Public Input No. 4007-NFPA 70-2023 [ Part III. ]

### Part III. Floating Buildings and Fixed Piers

#### Statement of Problem and Substantiation for Public Input

“Piers”, as defined in the NEC, is a more all-encompassing term for the various locations electrical systems can be installed on structures over bodies of water. There should be great care taken to ensure sections of the code are not so restrictive in their wording that there are holes in applicability for all areas of related safety concerns.

Fixed piers (i.e., “fixed buildings”) over water are just as likely as producing electric shock hazards in water as floating buildings. Replacing “floating buildings” with “fixed and floating piers” removes this issue.

#### Submitter Information Verification

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**Committee:** NEC-P07

**Public Input No. 3774-NFPA 70-2023 [ New Article after 682 ]****Relocate Article 682 to a stand-alone Chapter XX for Bodies of Water****Statement of Problem and Substantiation for Public Input**

Consider creating a separate Chapter within the NEC to cover the requirements for “Bodies of Water” (Refer to National Electrical Code® Correlating Committee White Paper: “Keeping the NEC® Relevant – Is Now the Time to Modernize?”).

Chapter XX Installations Associated with Bodies of Water

XX10 Swimming Pools, Fountains, and Similar Installations (Article 680)

XX12 Natural and Artificially Made Bodies of Water (Article 682)

XX14 Marinas, Boatyards, Floating Buildings, and Commercial and Noncommercial Docking Facilities (Article 555)

Enforcement of the NEC is conducted by many disciplines that can include electrical inspectors, consulting engineers, building officials and fire officials. By grouping "bodies of water" in one Chapter, it would encourage a more robust layout that will enhance the stability and usability for the next several decades and beyond.

**Related Public Inputs for This Document****Related Input**

[Public Input No. 3620-NFPA 70-2023 \[New Article after 680\]](#)

[Public Input No. 3778-NFPA 70-2023 \[New Article after 555\]](#)

**Relationship**

Proposed relocation of Article 680

Proposed relocation of Article 555

**Submitter Information Verification**

**Submitter Full Name:** Dean Hunter

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**Submittal Date:** Tue Sep 05 15:55:36 EDT 2023

**Committee:** NEC-P07

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**Public Input No. 2415-NFPA 70-2023 [ Section No. 682.33(C)(1) ]****(1) Bonded Parts.**

The parts specified in 682.33(C)(1) through (C)(3) shall be bonded together and to the electrical grounding system. Bonding conductors shall be solid copper, insulated, covered or bare, and not smaller than 8 AWG. Connections shall be made by exothermic welding or by listed pressure connectors or clamps that are labeled as being suitable for the purpose and are of stainless steel, brass, copper, or copper alloy. Electrical connections using dissimilar metals that are exposed to damp, wet, or corrosive conditions shall be environmentally sealed (as air-tight and water-tight) against the effects of corrosion or otherwise protected using materials listed for the purpose .

**Additional Proposed Changes**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
PI_2415_Attachment_C_.pdf		✓

**Statement of Problem and Substantiation for Public Input**

Secure grounding and bonding connections are essential to a safe electrical system. Grounding is essential to ensure a safe return path for electrical current. Bonding ensures that all metal parts of electrical equipment have the same electrical potential, reducing the risk of shock hazard and damage. Both grounding and bonding are necessary for an electrical system to ensure safety, reliability, and performance.

The effects of corrosion on grounding and bonding connections, especially outdoors or in humid or corrosive environments are significant. Humidity causes metals to corrode and can accelerate the galvanic action caused by using dissimilar metals used to bond electrical equipment. Corrosive atmospheres, such as in a swimming pool equipment room can quickly corrode grounding and bonding connections, rendering them unsafe.

Galvanic corrosion is an electrochemical process in which one metal corrodes preferentially when it is in electrical contact with another, in the presence of an electrolyte, such as water. By keeping the electrolyte away from the connection, corrosion can be significantly reduced.

Connections using dissimilar metals will quickly corrode when exposed to weather or corrosive conditions, causing failure of the bonding pathway. Corrosion is a major problem for electrical connections, as it can lead to increased resistance and heating. Corrosion can lead to connections becoming oxidized, creating a high resistance contact, and can ultimately lead to the failure of the connection. Poor grounding and bonding connections can result in an electrical potential on exposed metal parts, which may result in property damage, injury, or death.

Corrosion is a natural phenomenon which occurs under certain moisture, temperature and atmospheric conditions; it cannot be avoided, only mitigated. Corrosion weakens products therefore affecting their function and integrity.

Corrosion is a large problem. A 2002 study by the National Association of Corrosion Engineers, backed by the Federal Highway Administration, estimated corroding metals in various industries, infrastructure and manufacturing cost \$276 billion annually.

For example, the United States Consumer Product Safety Commission (CPSC) ordered a recall of 1.3 million grounding lugs due to corrosion issues in 2014. Although no deaths were attributed to the recall, the cost to replace the lugs was significant.

In another case, a recent article illustrated significant lightning damage to Orange County Florida's public emergency communications equipment. 1 The damage was caused by lightning strikes and corrosion of

bonding connections on lightning protection conductors. These damages were between one and two million dollars over a ten-year period.

According to the CPSC, approximately 90 people are electrocuted annually in the United States due to appliances or wiring issues. There are also at least 30,000 non-fatal shock incidents per year in the United States. Each year, approximately 5% of all burn unit admissions in the United States occur because of electrical injuries.

Preventing corrosion of grounding and bonding connections in wet, damp, or corrosive atmospheres can be challenging. Equipment located in these conditions are exposed to the elements, which can result in atypical situations where the usual practices for bonding may not perform as intended. For example, many listed grounding lugs are not designed to be installed outdoors; using a lug that is not rated for outdoor use can lead to premature failures in the intended path for fault current, impairing the functionality of overcurrent and ground-fault protection devices. Other issues include corrosion of bonding connections due to galvanic action.

Grounding lugs can damage the protective anodized coating on aluminum module frames and rails. For example, some manufacturers suggest scraping, cutting, or scuffing the anodized coating. Unless the connection is sealed (as air-tight and water-tight) from the elements, the aluminum becomes exposed to the environment which increases the rate of oxidation and galvanic corrosion. Corrosion at the connection will cause an increase in the connection's resistance, and eventual failure of the bond. However, some equipment manufacturers do not permit removal of the protective anodized coating, such as galvanization, to make electrical contact. This is because removal of the coating will facilitate corrosion.

Tests conducted on a variety of bonding connections indicated that most typical connections failed quickly when exposed to deteriorating agents. Damp-heat resistances were relatively unchanged over a 20-week period. However, most samples corroded in just a few weeks for the salt-mist tests. Samples using an antioxidant lasted slightly longer before failing. Lay-in lugs with washers and grounding clips and compound lasted more than 20 weeks in the salt mist condition, but still failed. 2

Using connection hardware that is environmentally sealed (as air-tight and water-tight) against the effects of corrosion will not only make installations safer but will reduce costs for the owner/operator.

Using an environmentally sealed electrical bonding device and bonding fastener with environmental seals creates an air-tight and water-tight seal around the teeth which make the electrical bonding connection and protect it from corrosion. As the nut and bolt are tightened the twisted teeth bite into the facing surfaces of the frames to penetrate any surface corrosion or coating and create a solid electrical connection that is air-tight and water-tight sealed against the elements and the effects of corrosion. Please refer to Attachments 1-4 for photographs of environmentally sealed washers. As can be seen in Attachments 3 and 4, the washer clearly provided good contact with the aluminum surface, while the silicone protects the connection from corrosion..

Environmentally sealed hardware creates more secure electrical connections by providing 360-degree protection against corrosion and degradation. This is achieved by embedding the washer in an air and watertight silicone layer. The silicone layer prevents moisture and other contaminants from coming into contact with the washer and mating surface, which can help to prevent corrosion and degradation of the electrical connection.

As a result of these benefits, environmentally sealed hardware can help to create more secure electrical connections that are less likely to fail. This is important for safety, as it can help to prevent electrical fires and other hazards. Environmentally sealed hardware is also important for reliability, as they can help to ensure that electrical connections remain functional for longer periods of time.

Here are some of the specific benefits of using environmentally sealed connections:

- Increased resistance to corrosion
- Reduced risk of electrical fires and shock hazards
- Improved reliability
- Longer lifespan

Notes:

1. All-Copper Grounding Systems End Million Dollar Losses at Emergency Response System. [West,

Donnelly, Sorley, 2016]

2. Accelerated Aging Tests on PV Grounding Connections [Wang et al., 2011]

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**Committee:** NEC-P07

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Merton Bunker & Associates, LLC

Stafford, VA 22554

September 2, 2023

National Fire Protection Association

Attn: Standards Administration

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Please see the attached supporting material and related permission to use the material for Public Inputs 2411, 2412, 2413, 2414, 2415, 2492, and 2493. These attachments are the same for all referenced Public Inputs.

I am submitting this PI on behalf of HYLIN SAFETY COMPANY.

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Thank you in advance for your attention to this matter. If you have any questions or concerns, please contact me at the phone number below.

Very truly yours,

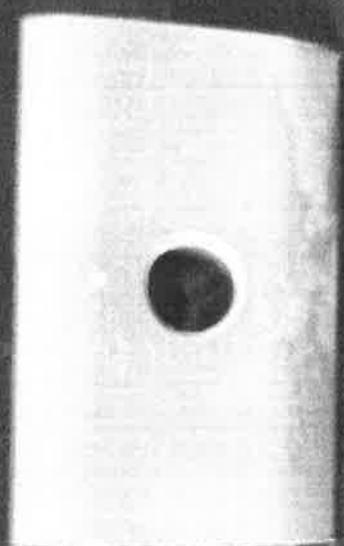


Merton Bunker, PE.

# Attachment #1

Hardware with an environmentally sealed washer.

For Public Inputs 2411, 2412, 2413, 2414, 2415, 2492, and 2493.

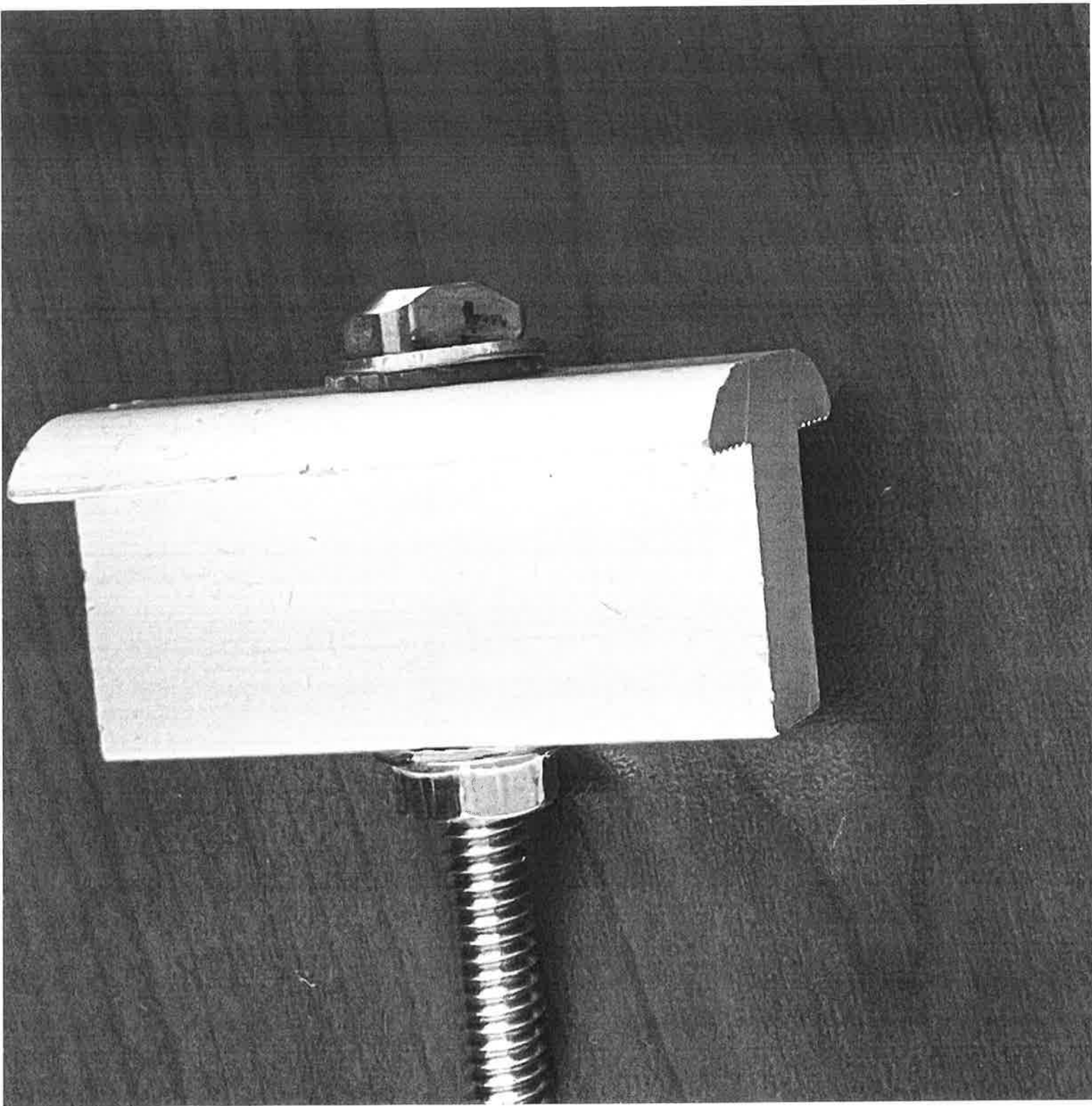


## Attachment #2

Hardware with an environmentally sealed washer.

For Public Inputs 2411, 2412, 2413, 2414, 2415, 2492, and 2493.



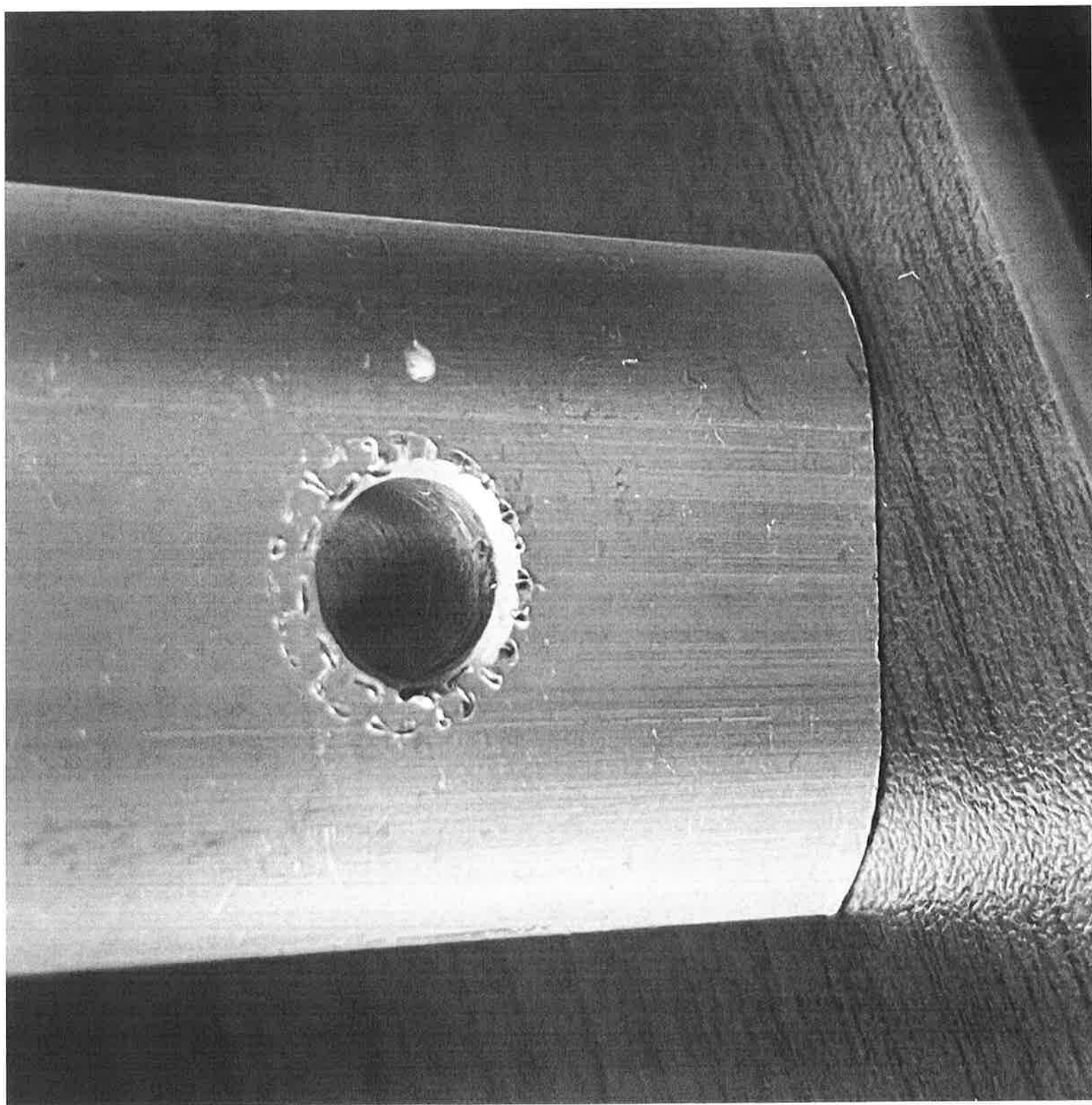




## **Attachment #3**

Aluminum surface showing contact by environmentally sealed washer.

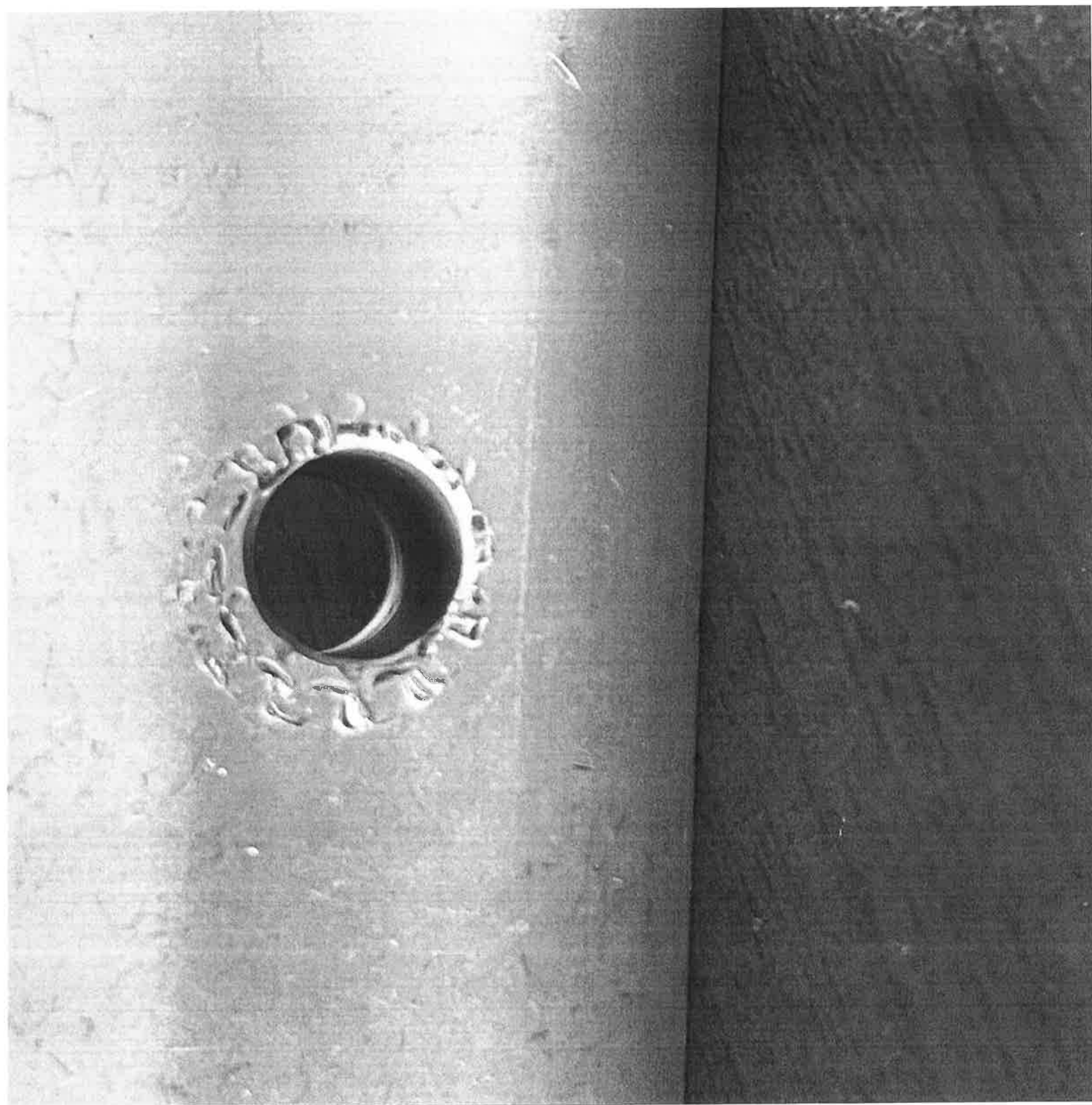
For Public Inputs 2411, 2412, 2413, 2414, 2415, 2492, and 2493.



## Attachment #4

Aluminum surface showing contact by environmentally sealed washer.

For Public Inputs 2411, 2412, 2413, 2414, 2415, 2492, and 2493.





## Public Input No. 1800-NFPA 70-2023 [ Definition: Equipotential Plane. ]

### Equipotential Plane.

Conductive parts bonded together to ~~reduce~~ minimize voltage gradients in a designated area.  
(682) (CMP-17)

## Statement of Problem and Substantiation for Public Input

Duplicate definition. I move that we combine both definitions of Equipotential Plane together to create one definition for this term.

## Submitter Information Verification

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**Committee:** NEC-P07

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## Public Input No. 3033-NFPA 70-2023 [ Definition: Equipotential Plane. ]

### **Equipotential Plane.**

~~Conductive parts bonded together to reduce voltage gradients in a designated area. (682)  
(CMP-17)~~

## Statement of Problem and Substantiation for Public Input

This definition was deleted to comply with the NEC Style Manual Section 2.1.2.7 regarding multiple definitions for the same term.

## Submitter Information Verification

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**Committee:** NEC-P07

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