Public Input No. 3616-NFPA 70-2020 [Global Input]

ARTICLE 371 Flexible Bus Systems

Part I. General

371.1 Scope.

This article covers the use and installation requirements of flexible bus systems and associated fittings.

371.2 Definition.

The definitions in this section shall apply within this article and throughout the Code.

Flexible Bus Systems. An assembly of flexible insulated bus, with a system of associated fittings used to support and terminate the bus.

> 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.

371.6 Listing Requirements. Flexible bus systems shall be listed.

Part II. Installation

371.10 Uses Permitted.

Flexible bus systems shall be permitted for the following:

(1) For services, feeders, and branch circuits

(2) Indoors

(3) Outdoors where identified for outdoor use

(4) Installed in corrosive, wet, or damp locations where identified for use

(5) Exposed

(6) Behind access panels where the space behind the access panel is not be used for air-handling purposes

(7) To penetrate through walls and floors

371.12 Uses Not Permitted.

Flexible bus systems shall not be permitted to be installed in the following:

(1) Hoistways

(2) Where exposed to severe physical damage

(3) Hazardous (classified) locations, unless specifically permitted in Chapter 5

(4) Air-handling spaces

371.14 Engineering Supervision. Flexible bus systems shall be designed and specified for specific installation site applications under engineering supervision.

371.17 Overcurrent Protection. Overcurrent protection shall be provided in accordance with 371.17(A) through (G).

(A) Rating of Overcurrent protection - Services. Flexible bus system installed for services shall be protected against overcurrent in accordance with 230.90.

(B) Rating of Overcurrent Protection — Feeders. Flexible bus systems installed as feeders shall be protected against overcurrent in accordance with 215.3.

Exception: The applicable requirements of 240.4 shall be permitted.

(C) Rating of Overcurrent Protection — Branch Circuits. Flexible bus systems installed as branch circuits shall be protected against overcurrent in accordance with 210.20.

Exception: The applicable requirements of 240.4 shall be permitted.

(D) Transformer Secondary Flexible Bus Systems. Flexible bus systems installed on transformer secondary to the disconnect and overcurrent protection device shall be protected from overcurrent in accordance with 240.21(C).

(E) Flexible Bus Systems from Generator Terminals. Flexible bus systems installed from generator terminals that meet the size requirement in 445.13 shall be permitted to be protected against overload by the generator overload protective device(s) required by 445.12.

(F) Flexible Bus Systems from Battery Terminals. Flexible bus systems installed for battery systems shall be protected from overcurrent in accordance with 240.4(H).

(G) Reduction in Size of Flexible Bus Systems. Overcurrent protection shall be required at the point where flexible bus systems are reduced in size.

Exception: For industrial establishments only, omission of overcurrent protection shall be permitted at points where a flexible bus system is reduced in size, provided that the length of the flexible bus system having a reduced size does not exceed 15 m (50 ft) and has a current rating at least equal to one-third the rating or setting of the overcurrent device ahead of the point of connection and provided that such a flexible bus system is free from contact with combustible material.

371.18 Flexible Bus Systems Installation. Installation of flexible bus systems shall comply with 371.18(A) and 371.18(B).

(A) Manufacturer's Installation Instructions. Flexible bus systems shall be installed under engineering supervision and in accordance with the manufacturer's instructions including supporting and securing. All documentation shall be available to the Authority Having Jurisdiction.

(B) Physical Damage. Flexible bus systems shall not be subject to severe physical damage. Flexible bus systems subject to physical damage shall have approved protective means installed.

Informational note. Typical methods of protecting flexible bus systems from physical damage include suitable barriers, guards, or elevation.

(C) Transversely Routed. Flexible bus systems shall be permitted to extend transversely through partitions, walls, or vertically through dry floors and platforms provided that the section within the wall is continuous and protected against physical damage.

(D) Through Floors and Platforms in Wet Locations. Flexible bus systems shall be permitted to extend vertically through floors and platforms in wet locations where:

(1) There are curbs or other suitable means to prevent waterflow through the floor or platform opening, and

(2) Where the flexible bus system provides a means to seal the floor penetration

371.20 Terminations. Flexible bus systems shall be terminated with fittings or devices listed for flexible bus systems.

371.30 Securing and Supporting. Flexible bus systems shall have a short circuit current rating sufficient for the available fault current. Flexible bus systems shall be secured and supported by listed associated fittings in accordance with 371.30(A) through 371.30(C).

(A) Associated fittings. Associated fittings shall be part of a listed flexible bus system.

(B) Support Brackets. The support brackets for flexible bus systems shall be secured to the building structure, or to other associated fittings that are secured to the building structure.

(C) Support Tray. Flexible bus systems shall be permitted to be installed in support trays supplied as associated fittings for the listed flexible bus system. Support trays shall not be required to be continuous.

371.60 Grounding. Conductive associated fitting supports for flexible bus systems shall be bonded together and grounded.

Part III. Construction Specifications

371.120 Marking. Each section of flexible bus systems shall be marked with the manufacturer's name or trade designation, voltage rating, and current rating. Markings shall be located so as to be visible after installation.

(1) **System Nameplate**. A system nameplate shall contain the manufacturer's name or trademark and the flexible bus system ratings. The ratings shall include as a minimum the voltage, phase, current, short circuit current rating, and applicable environmental ratings. The nameplate shall be installed at each end of the flexible bus system. The nameplate shall be visible after installation.

(2) **Associated Fittings**. Associated fittings shall be marked as suitable for flexible bus systems.

(3) **Flexible Insulated Bus**. The flexible insulated bus shall be marked along the insulation with the manufacturer's name or trademark, voltage, current rating, and insulation temperature ratings.

Part IV. Requirements for Over 1000 Volts, Nominal

371.214 Adjacent and Supporting Structures. Flexible bus systems shall be installed so that temperature rise from induced circulating currents in adjacent ferrous metal parts will not be hazardous to personnel or constitute a fire hazard.

371.216 Neutral Conductor. The neutral bus of a flexible bus system, where required, shall be sized to carry all neutral load current, including harmonic currents, and shall have adequate momentary and short-circuit current ratings consistent with system requirements.

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Statement of Problem and Substantiation for Public Input

Article 371 is a proposed new article to recognize flexible bus systems as a wiring method. This new product provides many of the benefits of both busduct and cable. It can easily be customized during installation in the field to account for field conditions. It does not have the long manufacturing lead time that exists for bus duct. It is not rigid and does not have the bending radius limitations that cable has, therefore, allows installation where there are space limitations or structural interference. Its flexibility reduces installation time by making it easier to make connections in the field, without the need for special tools. It is light in weight compared to an equivalent busduct or conductors in conduit. It reduces the installation time and cost. The lighter weight and flexibility also reduce strain for the installer while handling.

An investigation is presently underway by UL to create Outlines of Investigation for the flexible insulated bus and for flexible bus systems including the associated fittings. This activity is being conducted in parallel with establishing the code requirements to permit the use and application of this product.

Flexible bus systems are expected to be available in a wide range of current ratings from 400 to 4000 amperes. Flexible bus systems will be available with insulation that meets the latest standards, including Low Smoke, Halogen-free, and Flame-retardant ratings.

Some requirements from Articles 368 and 370 were used as templates to create equivalent applicable installation criteria for flexible bus systems.

This Article provides for the following:

Scope – The scope is established to recognize flexible bus systems as a wiring method and establishes the requirements to the application and installation of these systems.

Definition of flexible bus system – The definition provides the description of what a flexible bus system is relative to its application and installation under this Article. The system includes the flexible bus conductor assembly, the support mechanisms, the means to transition through the walls of enclosures, and the means to transition through building structural walls, floors or ceilings. Also included in the definitions is one for the flexible insulated bus to describe that part of the flexible bus system and differentiate it from typical wire type conductors or cables.

Listing requirement – Flexible bus systems are a new product in the NEC and is being supported by an UL Outline of Investigation. Similar to busways and other wiring methods this system needs to be supported by listing requirements to ensure consistent construction to meet the NEC installation requirements. The listing will provide specific ratings such as the current, temperature, and short circuit current ratings. Since this is an engineered system specific to each installation location, the listing provides the background for a manufacturer application guide for designers to use in specifying the flexible bus system. The listing will establish the limits for such things as the installation environmental, mechanical support limits, ambient temperature and other such considerations.

Uses Permitted and not Permitted – In developing the uses permitted, consideration was given to the applications found in Articles 368 and 370 including similarities and differences for this unique product, as well as other potential applications. Considerations were also made for where this product would not be suitable for use.

Engineering supervision - Most of these installations will be unique which may require unique securing and supporting structure requirements. This will be an engineered system specific to each installation location. The listing provides the background for a manufacturer application guide for designers to use in specifying the flexible bus system. The designer will need to consider such things as the actual installation site environment (wet, dry, corrosion), available fault current, ambient temperature, and other such considerations.

Overcurrent protection – This will be a listed wiring method whose current rating will be established through the listing process different than the ampacities assigned to wire type conductors. Since this wiring method is not using traditional conductors, the overcurrent protection requirements were established or pointed to specific parts of the NEC with the applicable overcurrent requirements.

Installation – These requirements were patterned after the requirements in Articles 368 and 370 but modified to account for how this unique product would need securing and supports since it is a flexible product and does not have the rigidity found in those other wiring methods. The installation requirements also established protection from physical damage since there is no overall enclosure for this system. The informational note was included to provide some guidance to the installer and AHJ on possible methods that could be employed for physical protection. Because this is a unique product that is engineered for each installation, all documentation including the engineering design and any manufacturer's installation instructions are required to be available to the AHJ to complete the installation inspection.

Terminations – The flexible bus system is a unique product that will not be using traditional conductor terminations. The terminations are specifically designed and listed for the flexible bus system and must be used.

Securing and Supporting - Flexible bus systems are not in any enclosure or other continuous metallic housing. The system requires support units that are part of the associated fittings and specifically designed and listed for flexible bus systems. These are independent support brackets or assemblies attached to the building structure or may be one or more sections of support tray. The support tray, where used, is attached to the building structure and is listed as one of the associated fittings. Support tray will be differentiated from cable tray through the listing of the flexible bus system and related markings. The support bracket(s) may also be attached to the support tray where there is no building structure readily available for mounting. It is not intended that flexible bus systems be installed in cable tray as provided in Article 392.

Grounding - Flexible bus systems are a unique product that is not in any enclosure that may provide an equipment grounding or bonding path. Part of the flexible bus system will provide the equipment grounding conductor path and this also provides the means to bond any independent support structure that may become energized.

Constructions specifications – markings – Flexible bus systems require markings denoting the manufacturer's name or trademark, identification and specific ratings of that system. These markings are to include system nameplates and markings on the separate components that comprise the overall system. The markings are required to be visible after the installation is complete so the AHJ can readily complete the inspection of the installation. While the overall markings are specified in the NEC article, the details of the markings are to be established in the listing process.

Over 1000 Volts – Flexible bus systems for over 1000-volt systems are to be installed to mitigate any induced voltages or currents in nearby ferrous metal structures due to magnetic fields around the flexible bus system. The neutral bus is to have a load current, and short circuit current rating suitable for the calculated neutral load and available short circuit current in the system design.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3786-NFPA 70-2020 [Section No. 225.3]	outside branch circuits/feeders
Public Input No. 3789-NFPA 70-2020 [Section No. 230.43]	1000V or less wiring method

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Submittal Date: Wed Sep 09 09:19:35 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7621-NFPA 70-2020

Statement: This First Revision creates a proposed new article for flexible bus systems. CMP-8 recognizes that, while this proposed new article contains a listing requirement, neither the associated product standard nor outline of investigation exists yet.

Based on the substantiation provided in PI 3616 and the presentation made to CMP-8 it is understood that the associated product standard and outline of investigation is being developed. It is further understood that the associated product standard or outline of investigation will be available prior to public comment closing date for the 2023 NEC to allow adequate opportunity for public review of the standard and submittal of public comments on this proposed new article.

Note: Definitions and MV material included here for completeness, needs to be relocated.

Public Input No. 3918-NFPA 70-2020 [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. In general, only those terms that are used in two or more articles are defined in Article 100. Definitions are also found in XXX.2 sections of other articles.

Part I of this article contains definitions intended to apply wherever the terms are used throughout this *Code*. Part II contains definitions applicable to installations and equipment operating at over 1000 volts, nominal. Part III contains definitions applicable to Hazardous (Classified) Locations.

Part I. General

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 by the structure 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.

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)

Ampacity.

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

Appliance.

Utilization equipment, generally other than industrial, that is normally built in standardized sizes or types 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)

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)

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.

Attachment Fitting.

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

> Informational Note: An attachment fitting is different from an attachment plug because no cord is associated with the fitting. An attachment fitting in combination with a locking support and mounting receptacle secures the associated utilization equipment in place and supports its weight.

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)

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

Battery System.

Interconnected battery subsystems consisting of one or more storage batteries and battery chargers, and can include inverters, converters, and associated electrical equipment. (CMP-13)

Bonded (Bonding).

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

Bonding Conductor or Jumper.

A reliable conductor to ensure the required electrical conductivity between metal parts required to be electrically connected. (CMP-5)

Bonding Jumper, Equipment.

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

Bonding Jumper, Main.

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.

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.

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)

Branch Circuit.

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

Branch Circuit, Appliance.

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.

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

Branch Circuit, Individual.

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

Branch Circuit, Multiwire.

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

Building.

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

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, Coaxial.

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, Optical Fiber.

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, Composite.

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

Cable, Optical Fiber, Conductive.

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, Nonconductive.

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

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)

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)

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.

Adjustable (as applied to circuit breakers).

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.

Instantaneous Trip (as applied to circuit breakers).

A qualifying term indicating that no delay is purposely introduced in the tripping action of the circuit breaker.

Inverse Time (as applied to circuit breakers).

A qualifying term indicating that there is purposely introduced a delay in the tripping action of the circuit breaker, which delay decreases as the magnitude of the current increases.

Nonadjustable (as applied to circuit breakers).

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.

Setting (of circuit breakers).

The value of current, time, or both, at which an adjustable circuit breaker is set to trip.

Circuit Integrity (CI) Cable.

Cable(s) used for remote-control, signaling, or power-limited systems that supply critical circuits to ensure survivability for continued circuit operation for a specified time under fire conditions. (CMP-3)

Class 1 Circuit.

The portion of the wiring system between the load side of the overcurrent device or power-limited supply and the connected equipment. (CMP-3)

Informational Note: See 725.41 for voltage and power limitations of Class 1 circuits.

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)

Clothes Closet.

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

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.

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.

Conductor, Bare.

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

Conductor, Covered.

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

Conductor, Insulated.

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

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, Pressure (Solderless).

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)

Continuous Load.

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

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)

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)

Cooking Unit, Counter-Mounted.

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)

Copper-Clad Aluminum Conductors.

Conductors drawn from a copper-clad aluminum rod, with the copper metallurgically bonded to an aluminum core, where the copper forms a minimum of 10 percent of the cross-sectional area of a solid conductor or each strand of a stranded conductor. (CMP-6)

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)

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)

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)

Device.

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

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)

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)

Duty, Continuous.

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

Duty, Intermittent.

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.

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

Duty, Short-Time.

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

Duty, Varying.

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

Dwelling, One-Family.

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

Dwelling, Two-Family.

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

Dwelling, Multifamily.

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)

Effective Ground-Fault Current Path.

An intentionally constructed, low-impedance electrically conductive path designed and intended to carry current under ground-fault conditions 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)

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 an interactive system. (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 Vehicle (EV).

An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. Plug-in hybrid electric vehicles (PHEV) are electric vehicles having a second source of motive power. Off-road, self-propelled electric mobile equipment, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats, and the like, are not considered electric vehicles. (CMP-12)

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 distance above a water level above which electrical equipment can be installed and electrical connections can be made. (CMP-7)

Electric-Discharge Lighting.

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

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)

Enclosed.

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

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)

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)

Equipotential Plane.

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

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)

Externally Operable.

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

Fault Current.

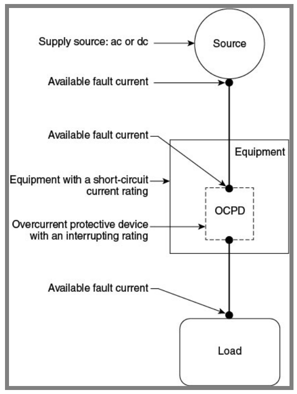
The current delivered at a point on the system during a short-circuit condition. (CMP-10)

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.



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)

Festoon Lighting.

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

Field Evaluation Body (FEB).

An organization or part of an organization that performs field evaluations of electrical or other equipment. [**790,** 2018] (CMP-1)

> Informational Note: NFPA 790-2018, *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 assembles 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,** 2018] (CMP-1)

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)

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)

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: For commercial garages, repair and storage, see Article 511.

Generating Capacity, Inverter.

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

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, metallic enclosures, metallic raceways, metallic equipment, or earth. (CMP-5)

Grounded (Grounding).

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

Grounded, Solidly.

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.

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: 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. For further information, see UL 943, *Standard for 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 Protection of Equipment.

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)

Grounding Conductor, Equipment (EGC).

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 Electrode.

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

Grounding Electrode Conductor.

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)

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)

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)

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)

Hybrid System.

A system comprised of multiple power sources. These power sources could include photovoltaic, wind, micro-hydro generators, engine-driven generators, and others, but do not include electric power production and distribution network systems. Energy storage systems such as batteries, flywheels, or superconducting magnetic storage equipment do not constitute a power source for the purpose of this definition. The energy regenerated by an overhauling (descending) elevator does not constitute a power source for the purpose of this definition. (CMP-4)

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).

Where this *Code* specifies that one equipment shall be “in sight from,” “within sight from,” or “within sight of,” and so forth, another equipment, the specified equipment is to be visible and not more than 15 m (50 ft) distant from the other. (CMP-1)

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.

The industrial control panel does not include the controlled equipment. (CMP-11)

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 as defined in Part I of Article 100 and do not process communications circuits as defined in 805.2. (CMP-12)

> Informational Note: For information on listing requirements for both information technology equipment and communications equipment, see UL 60950-1-2014, *Information Technology Equipment — Safety — Part 1: General Requirements* or UL 62368-1-2014, *Audio/Video Information and Communication Technology Equipment Part 1: Safety Requirements*.

Information Technology Equipment Room.

A room within the information technology equipment area that contains the information technology equipment. [**75:**3.3.14] (CMP-12)

Innerduct.

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

Interactive Inverter.

An inverter intended for use in parallel with power source(s) such as an electric utility to supply common loads and capable of delivering power to the utility. (CMP-13)

Interactive System.

An electric power production system that is operating in parallel with and capable of delivering energy to an electric primary source supply system. (CMP-4)

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.

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

Inverter.

Equipment that changes dc to ac. (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, Multimode.

Equipment having the capabilities of both the interactive inverter and the stand-alone inverter. (CMP-4)

Island Mode.

The operational mode for stand-alone power production equipment or an isolated microgrid, or for a multimode inverter or an interconnected microgrid that is disconnected from an electric power production and distribution network or other primary power source. (CMP-4)

> Informational Note: Isolated microgrids are distinguished from interconnected microgrids, which are addressed in Article 705.

Isolated (as applied to location).

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

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)

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)

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)

Location, Damp.

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.

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, Wet.

Installations underground or in concrete slabs or masonry in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; and in unprotected locations exposed to weather. (CMP-1)

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)

Messenger or Messenger Wire.

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)

Motor Control Center.

An assembly of one or more enclosed sections having a common power bus and principally containing motor control units. (CMP-11)

Multioutlet Assembly.

A type of surface, flush, or freestanding raceway designed to hold conductors and receptacles, assembled in the field or at the factory. (CMP-18)

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.

Nipple

A raceway system that is 24 inches or less. The nipple designation is only used for raceway fill calculations.

Nonautomatic.

Requiring human intervention to perform a function. (CMP-1)

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.

Outlet.

A point on the wiring system at which current is taken to supply utilization equipment. (CMP-1)

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)

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.

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. Such devices are provided with interrupting ratings appropriate for the intended use but no less than 5000 amperes. (CMP-10)

Overcurrent Protective Device, Supplementary.

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)

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)

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 or cutout box placed in or against a wall, partition, or other support; and accessible only from the front. (CMP-9)

Photovoltaic (PV) 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)

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:**3.3.17] (CMP-7)

Pier, Fixed.

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:**3.3.17.2] (CMP-7)

Pier, Floating.

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:**3.3.17.3] (CMP-7)

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)

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 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-Limited Tray Cable (PLTC).

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)

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 (a) wiring from the service point or power source to the outlets or (b) 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.

Prime Mover.

The machine that supplies the mechanical horsepower to a generator. (CMP-13)

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: Refer to *NFPA 70E*-2018, *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)

> Informational Note: A raceway is identified within specific article definitions.

Raceway, Communications.

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)

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)

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 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-10)

> Informational Note: The term *reconditioned* is frequently referred to as *rebuilt*, *refurbished*, or *remanufactured*.

Remote-Control Circuit.

Any electrical circuit that controls any other circuit through a relay or an equivalent device. (CMP-3)

Retrofit Kit.

A general term for a complete subassembly of parts and devices for field conversion of utilization equipment. (CMP-18)

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.

Separately Derived System.

An electrical source, 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 Cable.

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

Service Conductors.

The conductors from the service point to the service disconnecting means. (CMP-10)

Service Conductors, Overhead.

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.

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 Conductors, Overhead System.

The service conductors between the terminals of the service equipment and a point usually outside the building, clear of building walls, where joined by tap or splice to the service drop or overhead service conductors. (CMP-10)

Service-Entrance Conductors, Underground System.

The service conductors between the terminals of the service equipment and the point of connection to the service lateral or underground service conductors. (CMP-10)

> Informational Note: Where service equipment is located outside the building walls, there may be no service-entrance conductors or they may 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 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.

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)

Signaling Circuit.

Any electrical circuit that energizes signaling equipment. (CMP-3)

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)

Special Permission.

The written consent of the authority having jurisdiction. (CMP-1)

Stand-Alone System.

A system that is capable of supplying power independent of an electric power production and distribution network.(CMP-4)

Structure.

That which is built or constructed, other than equipment. (CMP-1)

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:

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.

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.

Type 3: Point of utilization SPDs.

Type 4: Component SPDs, including discrete components, as well as assemblies. (CMP-10)

> Informational Note: For further information on Type 1, Type 2, Type 3, and Type 4 SPDs, see UL 1449, *Standard for Surge Protective Devices*.

Switch, Bypass Isolation.

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)

Switch, General-Use.

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.

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.

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.

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)

Switch, Transfer.

An automatic or nonautomatic device for transferring one or more load conductor connections from one power source to another. (CMP-13)

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. These assemblies are generally accessible from the rear as well as from the front and are not intended to be installed in cabinets. (CMP-9)

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.

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.

Thermally Protected (as applied to motors).

A motor or motor-compressor that is provided with a thermal protector. (CMP-11)

Ungrounded.

Not connected to ground or to a conductive body that extends the ground connection. (CMP-5)

Uninterruptible Power Supply.

A power supply used to provide alternating current power to a load for some period of time in the event of a power failure. (CMP-13)

> Informational Note: In addition, it may provide a more constant voltage and frequency supply to the load, reducing the effects of voltage and frequency variations.

Utilization Equipment.

Equipment that utilizes electric energy for electronic, electromechanical, chemical, heating, lighting, or similar purposes. (CMP-1)

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, Nominal.

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).*

> Informational Note No. 3: Certain battery units may be considered to be rated at nominal 48 volts dc, but may have a charging float voltage up to 58 volts. In dc applications, 60 volts is used to cover the entire range of float voltages.

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.

Part II. Over 1000 Volts, Nominal

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. Electronically actuated fuses may or may not operate in a current-limiting fashion, depending on the type of control selected. (CMP-10)

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.

Controlled Vented Power Fuse.

A fuse with provision for controlling discharge circuit interruption such that no solid material may be exhausted into the surrounding atmosphere.

Informational Note: The fuse is designed so that discharged gases will not ignite or damage insulation in the path of the discharge or propagate a flashover to or between grounded members or conduction members in the path of the discharge where the distance between the vent and such insulation or conduction members conforms to manufacturer's recommendations.

Expulsion Fuse Unit (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.

Nonvented Power Fuse.

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

Power Fuse Unit.

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.

Vented Power Fuse.

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

Multiple Fuse.

An assembly of two or more single-pole fuses. (CMP-10)

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)

Switching Device.

A device designed to close, open, or both, one or more electrical circuits. (CMP-1)

Circuit Breaker.

A switching device capable of making, carrying, and interrupting currents under normal circuit conditions, and also of making, carrying for a specified time, and interrupting currents under specified abnormal circuit conditions, such as those of short circuit.

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 Means.

A device, group of devices, or other means whereby the conductors of a circuit can be disconnected from their source of supply.

Disconnecting (or Isolating) Switch (Disconnector, Isolator).

A mechanical switching device used for isolating a circuit or equipment from a source of power.

Interrupter Switch.

A switch capable of making, carrying, and interrupting specified currents.

Oil Cutout (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 switch having contacts that operate under oil (or askarel or other suitable liquid).

Regulator Bypass Switch.

A specific device or combination of devices designed to bypass a regulator.

Part III. Hazardous (Classified) Locations (CMP-14).

Aircraft Painting Hangar.

An aircraft hangar constructed for the express purpose of spray/coating/dipping applications and provided with dedicated ventilation supply and exhaust.

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

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

Associated Nonincendive Field Wiring Apparatus.

Apparatus in which the circuits are not necessarily nonincendive themselves but that affect the energy in nonincendive field wiring circuits and are relied upon to maintain nonincendive energy levels. Such apparatus are 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 in a hazardous (classified) location

Informational Note: Associated nonincendive field wiring apparatus has designated associated nonincendive field wiring apparatus connections for nonincendive field wiring apparatus and may also have connections for other electrical apparatus.

Combustible Dust.

Dust particles that are 500 microns or smaller (i.e., material passing a U.S. No. 35 Standard Sieve as defined in ASTM E11-2015, *Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves*), and present a fire or explosion hazard when dispersed and ignited in air.

> Informational Note: See ASTM E1226-2012a, *Standard Test Method for Explosibility of Dust Clouds*, or ISO 6184-1, *Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air*, for procedures for determining the explosibility of dusts.

Combustible Gas Detection System.

A protection technique utilizing stationary gas detectors in industrial establishments.

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.

Cord Connector.

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

Different Intrinsically Safe Circuits.

Intrinsically safe circuits in which the possible interconnections have not been evaluated and identified as intrinsically safe.

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.

> Informational Note No. 1: For further information on dust-ignitionproof enclosures, see ANSI/UL 1203-2015, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Hazardous (Classified) Locations*.

> Informational Note No. 2: Dust-ignitionproof enclosures are sometimes additionally marked Type 9 per NEMA 250-2014, *Enclosures for Electrical Equipment*.

Dusttight.

Enclosures constructed so that dust will not enter under specified test conditions.

> Informational Note No. 1: For further information, see ANSI/UL 121201-2017, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*.

> Informational Note No. 2: Enclosure Types 3, 3X, 3S, 3SX, 4, 4X, 5, 6, 6P, 12, 12K, and 13, per NEMA 250-2014, *Enclosures for Electrical Equipment* and ANSI/UL 50E-2015, *Enclosures for Electrical Equipment, Environmental Considerations*, are considered dusttight.

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.

> Informational Note: See ANSI/UL 60079-30-1-2017, *Explosive Atmospheres — Part 30-1: Electrical Resistance Trace Heating — General and Testing Requirements*.

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.

Informational Note: See ANSI/UL 60079-18-2015, *Explosive atmospheres — Part 18: Equipment protection by encapsulation “m”.*

Explosionproof Equipment.

Equipment enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that may occur within it and 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 thereby. (CMP-14)

Informational Note No. 1: For further information, see ANSI/UL 1203-2015, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.*

Informational Note No. 2: Explosionproof enclosures are sometimes additionally marked Type 7 per NEMA 250-2014, *Enclosures for Electrical Equipment*.

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.

Informational Note: See ANSI/UL 60079-1-2015, *Explosive Atmospheres — Part 1: Equipment Protection by Flameproof Enclosures “d”.*

Hermetically Sealed.

Equipment sealed against the entrance of an external atmosphere where the seal is made by fusion, for example, soldering, brazing, welding, or the fusion of glass to metal.

Informational Note: For further information, see ANSI/ISA-12.12.01-2013, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*.

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 so as to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks.

Informational Note: See ANSI/UL 60079-7–2017, *Explosive Atmospheres — Part 7: Equipment Protection by Increased Safety “e”.*

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.

Informational Note: See ANSI/UL 60079-28-2017, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*.

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.

Informational Note: See UL 913-2015, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1 Hazardous (Classified) Locations*; and ANSI/UL 60079-11-2013, *Explosive Atmospheres — Part 11: Equipment protection by intrinsic safety “i”.*

Intrinsically Safe Apparatus.

Apparatus in which all the circuits are intrinsically safe.

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.

> Informational Note: Test conditions are described in ANSI/UL 913-2013, *Standard for Safety, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*.

Intrinsically Safe System.

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

> Informational Note: An intrinsically safe system may include more than one intrinsically safe circuit.

Limited Finishing Workstation.

An apparatus that is capable of confining the vapors, mists, residues, dusts, or deposits that are generated by a spray application process but does not meet the requirements of a spray booth or spray room, as herein defined. [**33:**3.3.18.1]

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

Liquid Immersion "o".

Type of protection where electrical equipment is immersed in a protective liquid in such a way that an explosive atmosphere that may be above the liquid or outside the enclosure cannot be ignited.

> Informational Note: See ANSI/UL 60079-6-2016, *Explosive Atmospheres — Part 6: Equipment protection by liquid immersion "o".*

Major Repair Garage.

A building or portions of a building where major repairs, such as engine overhauls, painting, body and fender work, and repairs that require draining 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]

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 the proximity to other operations, finish quality, or concerns such as the collection of overspray.

> Informational Note: See Chapter 18 of NFPA 33-2016, *Standard for Spray Application Using Flammable or Combustible Materials*, for information on the construction and use of membrane enclosures.

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 associated floor space used for offices, parking, or showrooms. [**30A:**3.3.12.2]

Mobile Equipment.

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

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]

> Informational Note: Refer to Articles 510 and 511 with respect to electrical wiring and equipment for other areas used as lubritoriums, service rooms, repair rooms, offices, salesrooms, compressor rooms, and similar locations.

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.

> Informational Note: Conditions are described in ANSI/ISA-12.12.01-2013, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*.

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 a nonincendive component is not intended to exclude the flammable atmosphere or contain an explosion.

> Informational Note: For further information, see ANSI/ISA-12.12.01-2013, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2 Hazardous (Classified) Locations.*

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.

> Informational Note: For further information, see ANSI/ISA-12.12.01-2013, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*.

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.

Nonincendive Field Wiring Apparatus.

Apparatus intended to be connected to nonincendive field wiring.

> Informational Note: For further information, see ANSI/ISA-12.12.01-2013, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*.

Oil Immersion.

Electrical equipment immersed in a protective liquid in such a way that an explosive atmosphere that may be above the liquid or outside the enclosure cannot be ignited.

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 μm.

> Informational Note: For additional 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 μm, see ANSI/UL 60079-28-2017, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*.

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 cut-off 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.

Informational Note: See ANSI/UL 60079-28-2017, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*.

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. [**33:**3.3.2.3.1]

Portable Equipment.

Equipment with electrical components suitable to be moved by a single person without mechanical aids.

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.

Informational Note: See ANSI/UL 60079-5-2016, *Explosive Atmospheres — Part 5: Equipment protection by powder filling "q".*

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 ignitible fibers/flyings.

Pressurized Enclosure "p".

Type of protection for electrical equipment that uses the technique of guarding against the ingress of the external atmosphere, which may be explosive, into an enclosure by maintaining a protective gas therein at a pressure above that of the external atmosphere.

Informational Note: See ANSI/UL-60079-2-2017, *Explosive Atmospheres — Part 2: Equipment protection by pressurized enclosures "p".*

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.

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.

Informational Note: See ANSI/UL 60079-28-2017, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*.

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.

Informational Note: See ANSI/UL 60079-28-2017, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*.

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.

Informational Note: For additional information, see ANSI/UL 60079-31-2015, *Explosive Atmospheres — Part 31: Equipment Dust Ignition Protection by Enclosure "t".*

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 ignitible fiber.

Informational Note: For further information, see ANSI/NFPA 496-2013, *Purged and Pressurized Enclosures for Electrical Equipment*.

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.

Informational Note No. 1: The following apparatus 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: For further information, refer to ANSI/UL 913-2013, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations*; and ANSI/UL 60079-11-2013, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i."*

Spray Area.

Any fully enclosed, partly enclosed, or unenclosed area in which dangerous quantities of 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]

Informational Note: Unenclosed spray areas are locations outside of buildings or are localized operations within a larger room or space. Such 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.

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:**3.3.15]

Informational Note: A spray booth is an enclosure or insert within a larger room used for spray/coating/dipping applications. A spray booth can be fully enclosed or have open front or face and can include 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 used exclusively for open spraying of flammable or combustible materials. [**33:**3.3.16]

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.

Informational Note: See ANSI/UL 60079-15-2013, *Explosive Atmospheres — Part 15: Equipment Protection by Type of Protection "n".*

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.

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]

Ventilated.

Provided with a means to permit circulation of air sufficient to remove an excess of heat, fumes, or vapors.

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.

Statement of Problem and Substantiation for Public Input

The term nipple is used so often to try and eliminate the support requirements for raceway systems. A clear definition will eliminate any confusion caused by the current use of the term nipple.

Submitter Information Verification

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Submittal Date: Wed Sep 09 15:27:54 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: The proposed definition of a “nipple” contains requirements within the definition which is not compliant with the NEC and Section 2.2.2.2 of the 2020 NFPA Style Manuals

Public Input No. 3924-NFPA 70-2020 [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. In general, only those terms that are used in two or more articles are defined in Article 100. Definitions are also found in XXX.2 sections of other articles.

Part I of this article contains definitions intended to apply wherever the terms are used throughout this *Code*. Part II contains definitions applicable to installations and equipment operating at over 1000 volts, nominal. Part III contains definitions applicable to Hazardous (Classified) Locations.

Part I. General

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 by the structure 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.

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)

Ampacity.

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

Appliance.

Utilization equipment, generally other than industrial, that is normally built in standardized sizes or types 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)

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)

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.

Attachment Fitting.

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

> Informational Note: An attachment fitting is different from an attachment plug because no cord is associated with the fitting. An attachment fitting in combination with a locking support and mounting receptacle secures the associated utilization equipment in place and supports its weight.

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)

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

Battery System.

Interconnected battery subsystems consisting of one or more storage batteries and battery chargers, and can include inverters, converters, and associated electrical equipment. (CMP-13)

Bonded (Bonding).

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

Bonding Conductor or Jumper.

A reliable conductor to ensure the required electrical conductivity between metal parts required to be electrically connected. (CMP-5)

Bonding Jumper, Equipment.

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

Bonding Jumper, Main.

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.

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.

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)

Branch Circuit.

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

Branch Circuit, Appliance.

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.

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

Branch Circuit, Individual.

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

Branch Circuit, Multiwire.

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

Building.

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

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, Coaxial.

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, Optical Fiber.

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, Composite.

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

Cable, Optical Fiber, Conductive.

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, Nonconductive.

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

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)

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)

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.

Adjustable (as applied to circuit breakers).

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.

Instantaneous Trip (as applied to circuit breakers).

A qualifying term indicating that no delay is purposely introduced in the tripping action of the circuit breaker.

Inverse Time (as applied to circuit breakers).

A qualifying term indicating that there is purposely introduced a delay in the tripping action of the circuit breaker, which delay decreases as the magnitude of the current increases.

Nonadjustable (as applied to circuit breakers).

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.

Setting (of circuit breakers).

The value of current, time, or both, at which an adjustable circuit breaker is set to trip.

Circuit Integrity (CI) Cable.

Cable(s) used for remote-control, signaling, or power-limited systems that supply critical circuits to ensure survivability for continued circuit operation for a specified time under fire conditions. (CMP-3)

Class 1 Circuit.

The portion of the wiring system between the load side of the overcurrent device or power-limited supply and the connected equipment. (CMP-3)

Informational Note: See 725.41 for voltage and power limitations of Class 1 circuits.

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)

Clothes Closet.

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

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.

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.

Conductor, Bare.

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

Conductor, Covered.

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

Conductor, Insulated.

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

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, Pressure (Solderless).

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)

Continuous Load.

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

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)

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)

Cooking Unit, Counter-Mounted.

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)

Copper-Clad Aluminum Conductors.

Conductors drawn from a copper-clad aluminum rod, with the copper metallurgically bonded to an aluminum core, where the copper forms a minimum of 10 percent of the cross-sectional area of a solid conductor or each strand of a stranded conductor. (CMP-6)

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)

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)

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)

Device.

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

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)

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)

Duty, Continuous.

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

Duty, Intermittent.

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.

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

Duty, Short-Time.

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

Duty, Varying.

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

Dwelling, One-Family.

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

Dwelling, Two-Family.

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

Dwelling, Multifamily.

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)

Effective Ground-Fault Current Path.

An intentionally constructed, low-impedance electrically conductive path designed and intended to carry current under ground-fault conditions 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)

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 an interactive system. (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 Vehicle (EV).

An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. Plug-in hybrid electric vehicles (PHEV) are electric vehicles having a second source of motive power. Off-road, self-propelled electric mobile equipment, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats, and the like, are not considered electric vehicles. (CMP-12)

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 distance above a water level above which electrical equipment can be installed and electrical connections can be made. (CMP-7)

Electric-Discharge Lighting.

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

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)

Enclosed.

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

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)

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)

Equipotential Plane.

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

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)

Externally Operable.

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

Fault Current.

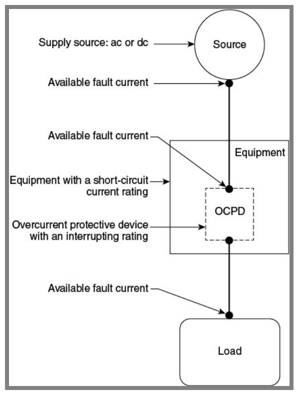
The current delivered at a point on the system during a short-circuit condition. (CMP-10)

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.



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)

Festoon Lighting.

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

Field Evaluation Body (FEB).

An organization or part of an organization that performs field evaluations of electrical or other equipment. [**790,** 2018] (CMP-1)

> Informational Note: NFPA 790-2018, *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 assembles 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,** 2018] (CMP-1)

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)

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)

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: For commercial garages, repair and storage, see Article 511.

Generating Capacity, Inverter.

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

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, metallic enclosures, metallic raceways, metallic equipment, or earth. (CMP-5)

Grounded (Grounding).

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

Grounded, Solidly.

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.

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: 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. For further information, see UL 943, *Standard for 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 Protection of Equipment.

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)

Grounding Conductor, Equipment (EGC).

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 Electrode.

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

Grounding Electrode Conductor.

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)

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)

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)

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)

Hybrid System.

A system comprised of multiple power sources. These power sources could include photovoltaic, wind, micro-hydro generators, engine-driven generators, and others, but do not include electric power production and distribution network systems. Energy storage systems such as batteries, flywheels, or superconducting magnetic storage equipment do not constitute a power source for the purpose of this definition. The energy regenerated by an overhauling (descending) elevator does not constitute a power source for the purpose of this definition. (CMP-4)

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).

Where this *Code* specifies that one equipment shall be “in sight from,” “within sight from,” or “within sight of,” and so forth, another equipment, the specified equipment is to be visible and not more than 15 m (50 ft) distant from the other. (CMP-1)

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.

The industrial control panel does not include the controlled equipment. (CMP-11)

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 as defined in Part I of Article 100 and do not process communications circuits as defined in 805.2. (CMP-12)

> Informational Note: For information on listing requirements for both information technology equipment and communications equipment, see UL 60950-1-2014, *Information Technology Equipment — Safety — Part 1: General Requirements* or UL 62368-1-2014, *Audio/Video Information and Communication Technology Equipment Part 1: Safety Requirements*.

Information Technology Equipment Room.

A room within the information technology equipment area that contains the information technology equipment. [**75:**3.3.14] (CMP-12)

Innerduct.

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

Interactive Inverter.

An inverter intended for use in parallel with power source(s) such as an electric utility to supply common loads and capable of delivering power to the utility. (CMP-13)

Interactive System.

An electric power production system that is operating in parallel with and capable of delivering energy to an electric primary source supply system. (CMP-4)

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.

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

Inverter.

Equipment that changes dc to ac. (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, Multimode.

Equipment having the capabilities of both the interactive inverter and the stand-alone inverter. (CMP-4)

Island Mode.

The operational mode for stand-alone power production equipment or an isolated microgrid, or for a multimode inverter or an interconnected microgrid that is disconnected from an electric power production and distribution network or other primary power source. (CMP-4)

> Informational Note: Isolated microgrids are distinguished from interconnected microgrids, which are addressed in Article 705.

Isolated (as applied to location).

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

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)

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)

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)

Location, Damp.

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.

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, Wet.

Installations underground or in concrete slabs or masonry in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; and in unprotected locations exposed to weather. (CMP-1)

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)

Messenger or Messenger Wire.

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)

Motor Control Center.

An assembly of one or more enclosed sections having a common power bus and principally containing motor control units. (CMP-11)

Multioutlet Assembly.

A type of surface, flush, or freestanding raceway designed to hold conductors and receptacles, assembled in the field or at the factory. (CMP-18)

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)

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.

Outlet.

A point on the wiring system at which current is taken to supply utilization equipment. (CMP-1)

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)

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.

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. Such devices are provided with interrupting ratings appropriate for the intended use but no less than 5000 amperes. (CMP-10)

Overcurrent Protective Device, Supplementary.

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)

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)

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 or cutout box placed in or against a wall, partition, or other support; and accessible only from the front. (CMP-9)

Photovoltaic (PV) 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)

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:**3.3.17] (CMP-7)

Pier, Fixed.

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:**3.3.17.2] (CMP-7)

Pier, Floating.

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:**3.3.17.3] (CMP-7)

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)

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 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-Limited Tray Cable (PLTC).

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)

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 (a) wiring from the service point or power source to the outlets or (b) 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.

Prime Mover.

The machine that supplies the mechanical horsepower to a generator. (CMP-13)

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: Refer to *NFPA 70E*-2018, *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)

> Informational Note: A raceway is identified within specific article definitions.

Raceway, Communications.

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)

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)

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 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-10)

> Informational Note: The term *reconditioned* is frequently referred to as *rebuilt*, *refurbished*, or *remanufactured*.

Remote-Control Circuit.

Any electrical circuit that controls any other circuit through a relay or an equivalent device. (CMP-3)

Retrofit Kit.

A general term for a complete subassembly of parts and devices for field conversion of utilization equipment. (CMP-18)

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.

Separately Derived System.

An electrical source, 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 Cable.

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

Service Conductors.

The conductors from the service point to the service disconnecting means. (CMP-10)

Service Conductors, Overhead.

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.

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 Conductors, Overhead System.

The service conductors between the terminals of the service equipment and a point usually outside the building, clear of building walls, where joined by tap or splice to the service drop or overhead service conductors. (CMP-10)

Service-Entrance Conductors, Underground System.

The service conductors between the terminals of the service equipment and the point of connection to the service lateral or underground service conductors. (CMP-10)

> Informational Note: Where service equipment is located outside the building walls, there may be no service-entrance conductors or they may 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 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.

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)

Signaling Circuit.

Any electrical circuit that energizes signaling equipment. (CMP-3)

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)

Special Permission.

The written consent of the authority having jurisdiction. (CMP-1)

Stand-Alone System.

A system that is capable of supplying power independent of an electric power production and distribution network.(CMP-4)

Structure.

That which is built or constructed, other than equipment. (CMP-1)

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:

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.

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.

Type 3: Point of utilization SPDs.

Type 4: Component SPDs, including discrete components, as well as assemblies. (CMP-10)

> Informational Note: For further information on Type 1, Type 2, Type 3, and Type 4 SPDs, see UL 1449, *Standard for Surge Protective Devices*.

Switch, Bypass Isolation.

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)

Switch, General-Use.

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.

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.

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.

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)

Switch, Transfer.

An automatic or nonautomatic device for transferring one or more load conductor connections from one power source to another. (CMP-13)

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. These assemblies are generally accessible from the rear as well as from the front and are not intended to be installed in cabinets. (CMP-9)

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.

Termination Point, Tubing termination, Conduit termination

The point at which a conduit, fitting, or other accessory component connects to the enclosure

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.

Thermally Protected (as applied to motors).

A motor or motor-compressor that is provided with a thermal protector. (CMP-11)

Ungrounded.

Not connected to ground or to a conductive body that extends the ground connection. (CMP-5)

Uninterruptible Power Supply.

A power supply used to provide alternating current power to a load for some period of time in the event of a power failure. (CMP-13)

> Informational Note: In addition, it may provide a more constant voltage and frequency supply to the load, reducing the effects of voltage and frequency variations.

Utilization Equipment.

Equipment that utilizes electric energy for electronic, electromechanical, chemical, heating, lighting, or similar purposes. (CMP-1)

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, Nominal.

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).*

Informational Note No. 3: Certain battery units may be considered to be rated at nominal 48 volts dc, but may have a charging float voltage up to 58 volts. In dc applications, 60 volts is used to cover the entire range of float voltages.

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.

Part II. Over 1000 Volts, Nominal

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. Electronically actuated fuses may or may not operate in a current-limiting fashion, depending on the type of control selected. (CMP-10)

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.

Controlled Vented Power Fuse.

A fuse with provision for controlling discharge circuit interruption such that no solid material may be exhausted into the surrounding atmosphere.

Informational Note: The fuse is designed so that discharged gases will not ignite or damage insulation in the path of the discharge or propagate a flashover to or between grounded members or conduction members in the path of the discharge where the distance between the vent and such insulation or conduction members conforms to manufacturer’s recommendations.

Expulsion Fuse Unit (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.

Nonvented Power Fuse.

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

Power Fuse Unit.

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.

Vented Power Fuse.

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

Multiple Fuse.

An assembly of two or more single-pole fuses. (CMP-10)

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)

Switching Device.

A device designed to close, open, or both, one or more electrical circuits. (CMP-1)

Circuit Breaker.

A switching device capable of making, carrying, and interrupting currents under normal circuit conditions, and also of making, carrying for a specified time, and interrupting currents under specified abnormal circuit conditions, such as those of short circuit.

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 Means.

A device, group of devices, or other means whereby the conductors of a circuit can be disconnected from their source of supply.

Disconnecting (or Isolating) Switch (Disconnector, Isolator).

A mechanical switching device used for isolating a circuit or equipment from a source of power.

Interrupter Switch.

A switch capable of making, carrying, and interrupting specified currents.

Oil Cutout (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 switch having contacts that operate under oil (or askarel or other suitable liquid).

Regulator Bypass Switch.

A specific device or combination of devices designed to bypass a regulator.

Part III. Hazardous (Classified) Locations (CMP-14).

Aircraft Painting Hangar.

An aircraft hangar constructed for the express purpose of spray/coating/dipping applications and provided with dedicated ventilation supply and exhaust.

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

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

Associated Nonincendive Field Wiring Apparatus.

Apparatus in which the circuits are not necessarily nonincendive themselves but that affect the energy in nonincendive field wiring circuits and are relied upon to maintain nonincendive energy levels. Such apparatus are 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 in a hazardous (classified) location

Informational Note: Associated nonincendive field wiring apparatus has designated associated nonincendive field wiring apparatus connections for nonincendive field wiring apparatus and may also have connections for other electrical apparatus.

Combustible Dust.

Dust particles that are 500 microns or smaller (i.e., material passing a U.S. No. 35 Standard Sieve as defined in ASTM E11-2015, *Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves*), and present a fire or explosion hazard when dispersed and ignited in air.

Informational Note: See ASTM E1226-2012a, *Standard Test Method for Explosibility of Dust Clouds*, or ISO 6184-1, *Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air*, for procedures for determining the explosibility of dusts.

Combustible Gas Detection System.

A protection technique utilizing stationary gas detectors in industrial establishments.

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.

Cord Connector.

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

Different Intrinsically Safe Circuits.

Intrinsically safe circuits in which the possible interconnections have not been evaluated and identified as intrinsically safe.

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.

Informational Note No. 1: For further information on dust-ignitionproof enclosures, see ANSI/UL 1203-2015, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Hazardous (Classified) Locations*.

Informational Note No. 2: Dust-ignitionproof enclosures are sometimes additionally marked Type 9 per NEMA 250-2014, *Enclosures for Electrical Equipment*.

Dusttight.

Enclosures constructed so that dust will not enter under specified test conditions.

Informational Note No. 1: For further information, see ANSI/UL 121201-2017, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*.

Informational Note No. 2: Enclosure Types 3, 3X, 3S, 3SX, 4, 4X, 5, 6, 6P, 12, 12K, and 13, per NEMA 250-2014, *Enclosures for Electrical Equipment* and ANSI/UL 50E-2015, *Enclosures for Electrical Equipment, Environmental Considerations*, are considered dusttight.

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.

Informational Note: See ANSI/UL 60079-30-1-2017, *Explosive Atmospheres — Part 30-1: Electrical Resistance Trace Heating — General and Testing Requirements*.

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.

Informational Note: See ANSI/UL 60079-18-2015, *Explosive atmospheres — Part 18: Equipment protection by encapsulation “m”.*

Explosionproof Equipment.

Equipment enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that may occur within it and 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 thereby. (CMP-14)

Informational Note No. 1: For further information, see ANSI/UL 1203-2015, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.*

Informational Note No. 2: Explosionproof enclosures are sometimes additionally marked Type 7 per NEMA 250-2014, *Enclosures for Electrical Equipment*.

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.

Informational Note: See ANSI/UL 60079-1-2015, *Explosive Atmospheres — Part 1: Equipment Protection by Flameproof Enclosures “d”.*

Hermetically Sealed.

Equipment sealed against the entrance of an external atmosphere where the seal is made by fusion, for example, soldering, brazing, welding, or the fusion of glass to metal.

Informational Note: For further information, see ANSI/ISA-12.12.01-2013, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*.

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 so as to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks.

Informational Note: See ANSI/UL 60079-7–2017, *Explosive Atmospheres — Part 7: Equipment Protection by Increased Safety “e”.*

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.

Informational Note: See ANSI/UL 60079-28-2017, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*.

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.

Informational Note: See UL 913-2015, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1 Hazardous (Classified) Locations*; and ANSI/UL 60079-11-2013, *Explosive Atmospheres — Part 11: Equipment protection by intrinsic safety “i”.*

Intrinsically Safe Apparatus.

Apparatus in which all the circuits are intrinsically safe.

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.

Informational Note: Test conditions are described in ANSI/UL 913-2013, *Standard for Safety, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*.

Intrinsically Safe System.

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

Informational Note: An intrinsically safe system may include more than one intrinsically safe circuit.

Limited Finishing Workstation.

An apparatus that is capable of confining the vapors, mists, residues, dusts, or deposits that are generated by a spray application process but does not meet the requirements of a spray booth or spray room, as herein defined. [**33:**3.3.18.1]

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

Liquid Immersion "o".

Type of protection where electrical equipment is immersed in a protective liquid in such a way that an explosive atmosphere that may be above the liquid or outside the enclosure cannot be ignited.

Informational Note: See ANSI/UL 60079-6-2016, *Explosive Atmospheres — Part 6: Equipment protection by liquid immersion "o".*

Major Repair Garage.

A building or portions of a building where major repairs, such as engine overhauls, painting, body and fender work, and repairs that require draining 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]

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 the proximity to other operations, finish quality, or concerns such as the collection of overspray.

Informational Note: See Chapter 18 of NFPA 33-2016, *Standard for Spray Application Using Flammable or Combustible Materials*, for information on the construction and use of membrane enclosures.

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 associated floor space used for offices, parking, or showrooms. [**30A:**3.3.12.2]

Mobile Equipment.

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

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]

Informational Note: Refer to Articles 510 and 511 with respect to electrical wiring and equipment for other areas used as lubritoriums, service rooms, repair rooms, offices, salesrooms, compressor rooms, and similar locations.

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.

Informational Note: Conditions are described in ANSI/ISA-12.12.01-2013, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*.

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 a nonincendive component is not intended to exclude the flammable atmosphere or contain an explosion.

Informational Note: For further information, see ANSI/ISA-12.12.01-2013, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2 Hazardous (Classified) Locations.*

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.

Informational Note: For further information, see ANSI/ISA-12.12.01-2013, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*.

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.

Nonincendive Field Wiring Apparatus.

Apparatus intended to be connected to nonincendive field wiring.

Informational Note: For further information, see ANSI/ISA-12.12.01-2013, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*.

Oil Immersion.

Electrical equipment immersed in a protective liquid in such a way that an explosive atmosphere that may be above the liquid or outside the enclosure cannot be ignited.

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 μm.

Informational Note: For additional 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 μm, see ANSI/UL 60079-28-2017, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*.

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 cut-off 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.

Informational Note: See ANSI/UL 60079-28-2017, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*.

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. [**33:**3.3.2.3.1]

Portable Equipment.

Equipment with electrical components suitable to be moved by a single person without mechanical aids.

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.

> Informational Note: See ANSI/UL 60079-5-2016, *Explosive Atmospheres — Part 5: Equipment protection by powder filling "q".*

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 ignitible fibers/flyings.

Pressurized Enclosure "p".

Type of protection for electrical equipment that uses the technique of guarding against the ingress of the external atmosphere, which may be explosive, into an enclosure by maintaining a protective gas therein at a pressure above that of the external atmosphere.

> Informational Note: See ANSI/UL-60079-2-2017, *Explosive Atmospheres — Part 2: Equipment protection by pressurized enclosures "p".*

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.

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.

> Informational Note: See ANSI/UL 60079-28-2017, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*.

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.

> Informational Note: See ANSI/UL 60079-28-2017, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*.

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.

> Informational Note: For additional information, see ANSI/UL 60079-31-2015, *Explosive Atmospheres — Part 31: Equipment Dust Ignition Protection by Enclosure "t".*

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 ignitible fiber.

> Informational Note: For further information, see ANSI/NFPA 496-2013, *Purged and Pressurized Enclosures for Electrical Equipment*.

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.

Informational Note No. 1: The following apparatus 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: For further information, refer to ANSI/UL 913-2013, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations*; and ANSI/UL 60079-11-2013, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i."*

Spray Area.

Any fully enclosed, partly enclosed, or unenclosed area in which dangerous quantities of 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]

Informational Note: Unenclosed spray areas are locations outside of buildings or are localized operations within a larger room or space. Such 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.

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:**3.3.15]

Informational Note: A spray booth is an enclosure or insert within a larger room used for spray/coating/dipping applications. A spray booth can be fully enclosed or have open front or face and can include 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 used exclusively for open spraying of flammable or combustible materials. [**33:**3.3.16]

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.

Informational Note: See ANSI/UL 60079-15-2013, *Explosive Atmospheres — Part 15: Equipment Protection by Type of Protection “n”.*

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.

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]

Ventilated.

Provided with a means to permit circulation of air sufficient to remove an excess of heat, fumes, or vapors.

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.

Statement of Problem and Substantiation for Public Input

The term tubing termination is unclear where the actual connection is. This is critical in the support requirements such as 358.30 for EMT. Exactly where is the tubing termination. Some would consider the fitting to be the termination point and as such consider the fitting to be a supporting means. This has been in conflict for many code cycles and still comes up regularly with inspectors and electricians.

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Committee:	NEC-P08

Committee Statement

Resolution: The proposed definition does not add clarity to the term "Termination Point", “Tubing Termination" or "Conduit Termination". “Termination” is used throughout the code and is not accurately define in the proposed text. The proposed definition combines multiple terms for a single definition and does not comply with the format identified in Section 2.2.2.5 of the 2020 NEC Style Manual.

Public Input No. 2895-NFPA 70-2020 [New Definition after Definition: Building.]

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.

Informational Note: For cablebus, refer to Article 370 (CMP-8)

Statement of Problem and Substantiation for Public Input

The definition for busways was relocated from Article 368 per the 2020 NEC Style Manual Section 2.2.2 and formatted per Sections 2.2.2.3.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2921-NFPA 70-2020 [Section No. 368.2]	

Submitter Information Verification

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Submittal Date: Thu Sep 03 08:52:22 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 2896-NFPA 70-2020 [New Definition after Definition: Cable Routing Assembly.]

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)

Statement of Problem and Substantiation for Public Input

The definition for cable tray systems was relocated from Article 392 per the 2020 NEC Style Manual Section 2.2.2 and formatted per Sections 2.2.2.3.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2948-NFPA 70-2020 [Section No. 392.2]	

Submitter Information Verification

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Submittal Date: Thu Sep 03 08:55:34 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 2897-NFPA 70-2020 [New Definition after Definition: Cable Routing Assembly.]

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.

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. (CMP-8)

Statement of Problem and Substantiation for Public Input

The definition for cablebus was relocated from Article 370 per the 2020 NEC Style Manual Section 2.2.2 and formatted per Sections 2.2.2.3.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2922-NFPA 70-2020 [Section No. 370.2]	

Submitter Information Verification

Submitter Full Name: David Kendall
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Submittal Date: Thu Sep 03 08:57:43 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 2898-NFPA 70-2020 [New Definition after Definition: Cable Routing Assembly.]

Cell. A single, enclosed tubular space in a floor made of precast cellular concrete slabs, the direction of the cell being parallel to the direction of the floor member. (372) (CMP-8)

Cell. A single enclosed tubular space in a cellular metal floor member, the axis of the cell being parallel to the axis of the metal floor member. (374) (CMP-8)

Statement of Problem and Substantiation for Public Input

The definitions for cell were relocated from Articles 372 and 374 per the 2020 NEC Style Manual Section 2.2.2 and formatted per Sections 2.2.2.3.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2924-NFPA 70-2020 [Section No. 372.2]	
Public Input No. 2925-NFPA 70-2020 [Section No. 374.2]	

Submitter Information Verification

Submitter Full Name: David Kendall
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Submittal Date: Thu Sep 03 08:59:35 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 2889-NFPA 70-2020 [New Definition after Definition: Conductor, Insulated.]

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

Conduit, High Density Polyethylene (High Density Polyethylene (HDPE) 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 (Intermediate Metal Conduit) (IMC). 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 (Liquidtight Flexible Metal Conduit) (LFMC). 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 (Liquidtight Flexible Nonmetallic Conduit) (LFNC). 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 Type LFNC-A

(2) A smooth inner surface with integral reinforcement within the raceway wall, designated as Type LFNC-B

(3) A corrugated internal and external surface without integral reinforcement within the raceway wall, designated as LFNC-C

Informational Note: FNMC is an alternative designation for LFNC. (CMP-8)

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

Conduit, Reinforced Thermosetting Resin (Reinforced Thermosetting Resin Conduit) (RTRC). 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 (Rigid Metal Conduit) (RMC). A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings. (CMP-8)

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

Statement of Problem and Substantiation for Public Input

The definitions for conduits were relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2 and formatted per Sections 2.2.2.3.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2902-NFPA 70-2020 [Section No. 342.2]	
Public Input No. 2903-NFPA 70-2020 [Section No. 344.2]	
Public Input No. 2906-NFPA 70-2020 [Section No. 348.2]	
Public Input No. 2908-NFPA 70-2020 [Section No. 350.2]	
Public Input No. 2910-NFPA 70-2020 [Section No. 352.2]	
Public Input No. 2911-NFPA 70-2020 [Section No. 353.2]	
Public Input No. 2912-NFPA 70-2020 [Section No. 354.2]	
Public Input No. 2914-NFPA 70-2020 [Section No. 355.2]	
Public Input No. 2915-NFPA 70-2020 [Section No. 356.2]	

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Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 2892-NFPA 70-2020 [New Definition after Definition: Guest Suite.]

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)**

Statement of Problem and Substantiation for Public Input

The definitions for gutters were relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2 and formatted per Sections 2.2.2.3.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2920-NFPA 70-2020 [Section No. 366.2]	

Submitter Information Verification

Submitter Full Name: David Kendall
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Submittal Date: Thu Sep 03 08:46:49 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 2900-NFPA 70-2020 [New Definition after Definition: Handhole Enclosure.]

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. (372) (CMP-8)

Header. A transverse raceway for electrical conductors, providing access to predetermined cells of a cellular metal floor, thereby permitting the installation of electrical conductors from a distribution center to the cells. (374) (CMP-8)

Statement of Problem and Substantiation for Public Input

The definitions for header were relocated from Articles 372 and 374 per the 2020 NEC Style Manual Section 2.2.2 and formatted per Sections 2.2.2.3.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2924-NFPA 70-2020 [Section No. 372.2]	
Public Input No. 2925-NFPA 70-2020 [Section No. 374.2]	

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Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 2891-NFPA 70-2020 [New Definition after Definition: Raceway.]

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, 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.

Statement of Problem and Substantiation for Public Input

The definitions for raceways were relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2 and formatted per Sections 2.2.2.3.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2924-NFPA 70-2020 [Section No. 372.2]	
Public Input No. 2925-NFPA 70-2020 [Section No. 374.2]	
Public Input No. 2942-NFPA 70-2020 [Section No. 384.2]	
Public Input No. 2943-NFPA 70-2020 [Section No. 386.2]	
Public Input No. 2945-NFPA 70-2020 [Section No. 388.2]	
Public Input No. 2947-NFPA 70-2020 [Section No. 390.2]	

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Submittal Date: Thu Sep 03 08:44:41 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 1189-NFPA 70-2020 [New Definition after Definition: Short-Circuit Current Rati...]

Short Sections as Applied to Enclosures and RacewayS

- Add a new definition "Short Sections as Applied to Enclosures and Raceways"
  - Numerous sections include the term "short section" when discussing enclosures or raceways; for example: ref. 250.86 Exception No. 2, 250.110 (5), 250.132, 300.10 Exception No. 1, 300.12 Exception No. 1, 300.18 Exception. The maximum length of a short section is not stated.
    - Defining the maximum length of a short section will lessen ambiguity and make interpretation and application less subjective.
      - A reasonable length for a "short section" is 10 feet as this is the standard length of non-flexible conduit and tubing.

Statement of Problem and Substantiation for Public Input

Add a new definition "Short Sections as Applied to Enclosures and Raceways"
Numerous sections include the term "short section" when discussing enclosures or raceways; for example: ref. 250.86 Exception No. 2, 250.110 (5), 250.132, 300.10 Exception No. 1, 300.12 Exception No. 1, 300.18 Exception. The maximum length of a short section is not stated.
Defining the maximum length of a short section will lessen ambiguity and make interpretation and application less subjective.
A reasonable length for a "short section" is 10 feet as this is the standard length of non-flexible conduit and tubing.

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Submittal Date: Sat May 23 05:24:26 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: The proposed text was not supplied with Public Input 1189 to define "Short Sections as

Applied to Enclosure and Raceways". In addition, a definition cannot contain technical requirements per 2.2.2.2 of the 2020 NEC Style Manual

Public Input No. 4398-NFPA 70-2020 [New Definition after Definition: Short-Circuit Current Rati...]

Short Sections (as applied to raceways)

A conduit or tubing segment that is not greater than the standard manufactured length of the raceway type. This segment is mechanically and electrically isolated from any other segments of raceway.

Informational Note: Short sections of raceway are commonly used to provide protection for exposed wiring and cable from physical damage.

Statement of Problem and Substantiation for Public Input

The term "short sections of raceway" is used in more than one location in the NEC to relax requirements where the section provides protection for exposed wiring. Unfortunately, what constitutes a short section is up to interpretation. Some say that since a standard length of conduit is 10-feet, a short-section should be equal to or less than 10-feet in length. On the other end of the spectrum I have seen or been made aware of where the relaxed rules of a "short section" were applied where the conduit installation was in excess of 100-feet in overall length. This is more than excessive, and the rules in 300.10, 300.12, and elsewhere should apply. A set value (10-feet) is not included because a requirement cannot be in the definition.

Submitter Information Verification

Submitter Full Name:	Jebediah Novak
Organization:	Cedar Rapids Electrical JATC
Affiliation:	IBEW Local #405
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Thu Sep 10 12:02:01 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: The proposed definition does not clarify a short section and applies a requirement that is a violation of 2.2.2.2 of the 2020 NEC Style Manual.

Public Input No. 2890-NFPA 70-2020 [New Definition after Definition: Thermally Protected (as ap...]

Tubing, Electrical Metallic (Electrical Metallic Tubing) (EMT). 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 (Electrical Nonmetallic Tubing) (ENT). A nonmetallic, pliable, corrugated raceway of circular cross section with integral or associated couplings, connectors, and fittings for the installation of electrical conductors. ENT 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 (Flexible Metallic Tubing) (FMT). A metal raceway that is circular in cross section, flexible, and liquidtight without a nonmetallic jacket. (CMP-8)

Statement of Problem and Substantiation for Public Input

The definitions for tubings were relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2 and formatted per Sections 2.2.2.3.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2916-NFPA 70-2020 [Section No. 358.2]	
Public Input No. 2917-NFPA 70-2020 [Section No. 360.2]	
Public Input No. 2918-NFPA 70-2020 [Section No. 362.2]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 08:41:06 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a

single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 2893-NFPA 70-2020 [New Definition after Definition: Weatherproof.]

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)

Statement of Problem and Substantiation for Public Input

The definitions for wireways were relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2 and formatted per Sections 2.2.2.3.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2927-NFPA 70-2020 [Section No. 376.2]	
Public Input No. 2928-NFPA 70-2020 [Section No. 378.2]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:

Submittal Date: Thu Sep 03 08:49:04 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 4448-NFPA 70-2020 [New Definition after Definition: Weatherproof.]

TITLE OF NEW CONTENT

Wireway. A sheet-metal or flame-retardant nonmetallic trough with hinged or removable covers for housing and protecting electric wires and cable and in which conductors are laid in place after the wireway has been installed as a complete system.

Statement of Problem and Substantiation for Public Input

The term "wireway" is used many times throughout the NEC without specifying whether it is metal or nonmetallic. As used, it is apparently intended to be generic but when asked for a definition there is none. This definition is taken from NFPA 79 so it is not my original material. Adding the definition will help the NEC user.

Submitter Information Verification

Submitter Full Name: Paul Dobrowsky
Organization: Innovative Technology Services
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 10 13:14:50 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 4327-NFPA 70-2020 [Article 342]

Article 342 Intermediate Metal Conduit: ~~Type~~ **(IMC)**

Part I. General

342.1 Scope.

This article covers the use, installation, and construction specifications for intermediate metal conduit (IMC) and associated fittings.

342.2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

Intermediate Metal Conduit (IMC).

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.

342.6 Listing Requirements.

IMC, factory elbows and couplings, and associated fittings shall be listed.

Part II. Installation

342.10 Uses Permitted.

(A) All Atmospheric Conditions and Occupancies.

Use of IMC shall be permitted under all atmospheric conditions and occupancies.

(B) Corrosion Environments.

IMC, elbows, couplings, and fittings shall be permitted to be installed in concrete, in direct contact with the earth, or in areas subject to severe corrosive influences where protected by corrosion protection approved for the condition.

(C) Cinder Fill.

IMC shall be permitted to be installed in or under cinder fill where subject to permanent moisture where protected on all sides by a layer of noncinder concrete not less than 50 mm (2 in.) thick; where the conduit is not less than 450 mm (18 in.) under the fill; or where protected by corrosion protection approved for the condition.

(D) Wet Locations.

All supports, bolts, straps, screws, and so forth, shall be of corrosion-resistant materials or protected against corrosion by corrosion-resistant materials.

Informational Note: See 300.6 for protection against corrosion.

(E) Severe Physical Damage.

IMC shall be permitted to be installed where subject to severe physical damage.

342.14 Dissimilar Metals.

Where practicable, dissimilar metals in contact anywhere in the system shall be avoided to eliminate the possibility of galvanic action.

Stainless steel and aluminum fittings and enclosures shall be permitted to be used with galvanized steel IMC where not subject to severe corrosive influences.

Stainless steel IMC shall only be used with the following:

(1) Stainless steel fittings

(2) Stainless steel boxes and enclosures

(3) Steel (galvanized, painted, powder or PVC coated, and so forth) boxes and enclosures when not subject to severe corrosive influences

(4) Stainless steel, nonmetallic, or approved accessories

342.20 Size.

(A) Minimum.

IMC smaller than metric designator 16 (trade size ½) shall not be used.

(B) Maximum.

IMC larger than metric designator 103 (trade size 4) shall not be used.

> Informational Note: See 300.1(C) for the metric designators and trade sizes. These are for identification purposes only and do not relate to actual dimensions.

342.22 Number of Conductors.

The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.

Cables shall be permitted to be installed where such use is not prohibited by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

342.24 Bends — How Made.

Bends of IMC shall be so made that the conduit will not be damaged and the internal diameter of the conduit will not be effectively reduced. The radius of the curve of any field bend to the centerline of the conduit shall not be less than indicated in Table 2, Chapter 9.

342.26 Bends — Number in One Run.

There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, for example, conduit bodies and boxes.

342.28 Reaming and Threading.

All cut ends shall be reamed or otherwise finished to remove rough edges. Where conduit is threaded in the field, a standard cutting die with a taper of 1 in 16 (¾ in. taper per foot) shall be used.

> Informational Note: See ANSI/ASME B1.20.1-2013, *Standard for Pipe Threads, General Purpose (Inch)*.

342.30 Securing and Supporting.

IMC shall be installed as a complete system in accordance with 300.18 and shall be securely fastened in place and supported in accordance with 342.30(A) and (B).

(A) Securely Fastened.

IMC shall be secured in accordance with one of the following:

(1) IMC shall be securely fastened within 900 mm (3 ft) of each outlet box, junction box, device box, cabinet, conduit body, or other conduit termination.

(2) Where structural members do not readily permit fastening within 900 mm (3 ft), fastening shall be permitted to be increased to a distance of 1.5 m (5 ft).

(3) Where approved, conduit shall not be required to be securely fastened within 900 mm (3 ft) of the service head for above-the-roof termination of a mast.

(B) Supports.

IMC shall be supported in accordance with one of the following:

(1) Conduit shall be supported at intervals not exceeding 3 m (10 ft).

(2) The distance between supports for straight runs of conduit shall be permitted in accordance with Table 344.30(B)(2), provided the conduit is made up with threaded couplings and supports that prevent transmission of stresses to termination where conduit is deflected between supports.

(3) Exposed vertical risers from industrial machinery or fixed equipment shall be permitted to be supported at intervals not exceeding 6 m (20 ft) if the conduit is made up with threaded couplings, the conduit is supported and securely fastened at the top and bottom of the riser, and no other means of intermediate support is readily available.

(4) Horizontal runs of IMC supported by openings through framing members at intervals not exceeding 3 m (10 ft) and securely fastened within 900 mm (3 ft) of termination points shall be permitted.

342.42 Couplings and Connectors.

(A) Threadless.

Threadless couplings and connectors used with conduit shall be made tight. Where buried in masonry or concrete, they shall be the concretetight type. Where installed in wet locations, they shall comply with 314.15. Threadless couplings and connectors shall not be used on threaded conduit ends unless listed for the purpose.

(B) Running Threads.

Running threads shall not be used on conduit for connection at couplings.

342.46 Bushings.

Where a conduit enters a box, fitting, or other enclosure, a bushing shall be provided to protect the wires from abrasion unless the box, fitting, or enclosure is designed to provide such protection.

> Informational Note: See 300.4(G) for the protection of conductors 4 AWG and larger at bushings.

342.56 Splices and Taps.

Splices and taps shall be made in accordance with 300.15.

342.60 Grounding.

IMC shall be permitted as an equipment grounding conductor.

Part III. Construction Specifications

342.100 Construction.

IMC shall be made of one of the following:

(1) Steel, with protective coatings

(2) Stainless steel

342.120 Marking.

Each length shall be clearly and durably marked at least every 1.5 m (5 ft) with the letters IMC. Each length shall be marked as required in the first sentence of 110.21(A).

Statement of Problem and Substantiation for Public Input

The only revision in this Public Input is to the Title of the Article.
The word "Type" is used over 1,200 times in the NEC and often it is not necessary.
With the Raceway articles the word is used more than it is ever spoken. When people discuss or write issues regarding a raceway wiring method they just say "IMC" or "IMC Conduit" they do not use the word Type. The Revised Style Manual references if the defined term in Article 100 includes an acronym it is permitted to use just the acronym any subsequent time it is referenced in the NEC. CMP-8 should consider revising the all definitions under their purview to include an acronym and not to use the word "Type". The use of the word type should also be remove through out the article if possible.

Submitter Information Verification

Submitter Full Name:	David Williams
Organization:	Delta Charter Township
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Thu Sep 10 10:11:49 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: Removing the word “Type” from the Article title is not necessary. Even though it may not be referred to when discussing IMC, all raceway Article titles include the word “Type” prior to the acronym. For consistency in the NEC title descriptions the word should remain.

Public Input No. 2902-NFPA 70-2020 [Section No. 342.2]

~~**342.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

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

~~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.~~

Statement of Problem and Substantiation for Public Input

The definition for IMC was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2889-NFPA 70-2020 [New Definition after Definition: Conductor, Insulated.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:07:03 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3541-NFPA 70-2020 [Section No. 342.2]

(Relocate all definitions in the 342. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

342. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

Intermediate Metal Conduit (IMC).

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.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams

Organization: Delta Charter Township

Street Address:

City:

State:

Zip:

Submittal Date: Tue Sep 08 21:52:27 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 4344-NFPA 70-2020 [Definition: Intermediate Metal Conduit (IMC).]

(Relocate all definitions to Article 100)

Intermediate Metal Conduit (IMC).

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)

Statement of Problem and Substantiation for Public Input

The definition needs to be relocated to Article 100 per the revised NEC Style Manual, 2.2.2.
The code panel designation has been added after the definition. (CMP-8)
CMP-8 should consider revising the all definitions under their purview to include an acronym for permitted applications in the code. NEC Style Manual, 3.2.3. The permitted use of acronyms in the NEC has changed with the Style Manual revisions in 3.2.3. When a term is defined in Article 100 and includes an acronym, that acronym is permitted to be used elsewhere through out the code.

Submitter Information Verification

Submitter Full Name:	David Williams
Organization:	Delta Charter Township
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Thu Sep 10 10:48:45 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 854-NFPA 70-2020 [Section No. 342.10(A)]

(A) All Atmospheric Conditions and Occupancies.

~~Use of IMC~~ IMC, elbows, couplings, and fittings shall be permitted under all atmospheric conditions and occupancies.

Statement of Problem and Substantiation for Public Input

The addition of "elbows, couplings, and fittings" harmonizes the language with 342.10(B) and makes it clear that these components are acceptable for use in all atmospheric conditions and occupancies.

Submitter Information Verification

Submitter Full Name:	David Kendall
Organization:	ABB Inc.
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Fri Apr 10 10:35:27 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: The submitter did not provide substantiation that there is confusion that IMC elbows, couplings and fittings are not permitted to be installed in all atmospheric conditions and occupancies.

Public Input No. 855-NFPA 70-2020 [Section No. 342.10(C)]

(C) Cinder Fill.

IMC, elbows, couplings, and fittings shall be permitted to be installed in or under cinder fill where subject to permanent moisture where protected on all sides by a layer of noncinder concrete not less than 50 mm (2 in.) thick; where the conduit is not less than 450 mm (18 in.) under the fill; or where protected by corrosion protection approved for the condition.

Statement of Problem and Substantiation for Public Input

The addition of "elbows, couplings, and fittings" harmonizes the language with 342.10(B) and makes it clear that these components are acceptable for use in cider fill.

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:

Submittal Date: Fri Apr 10 10:40:52 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: The submitter did not provide substantiation that there is confusion that IMC elbows, couplings and fittings are not permitted to be installed in all atmospheric conditions and occupancies.

Public Input No. 3318-NFPA 70-2020 [Section No. 342.14]

342.14 ~~Dissimilar~~ Dissimilar Metals.

Where practicable, dissimilar metals in contact anywhere in the raceway system shall be avoided to eliminate the possibility of galvanic action. Raceway system components made of the same material shall be permitted to be used together, additionally the following dissimilar metallic combinations may be used:

(1) Stainless steel and aluminum fittings and enclosures shall be permitted to be used with

~~galvanized steel IMC where not subject to severe corrosive influences.~~

(1) IMC made of galvanized steel.

(2) **Stainless steel**

~~IMC~~

(1) **and aluminum fittings and enclosures shall**

~~only~~

(1) **be permitted to be used with**

~~the following:~~

- ~~Stainless steel fittings~~
- ~~Stainless steel boxes and enclosures~~

~~Steel (galvanized, painted, powder or PVC coated, and so forth) boxes and enclosures when~~

(1) **IMC made of stainless steel.**

(2) **Galvanized or stainless steel fittings and enclosures shall be permitted to be used with IMC made of aluminum where the dissimilar metal connection is not subject to severe corrosive influences**

~~Stainless steel, nonmetallic, or approved accessories~~

(1) ~~.~~

~~**Note: Transitions of IMC to and from non-metallic materials are not prohibited by this section if permitted elsewhere in the code.**~~

Statement of Problem and Substantiation for Public Input

The existing 2020 language in this section is written such to prohibit the use of stainless steel IMC with anything other than stainless RMC accessories. Not even non-metallic connections are permitted.

This section of the code should be clear that it only applies to the IMC fittings and raceways. If they happen to connect to a non-metallic enclosure that is already handled elsewhere in the code. The galvanic corrosion differences between stainless, aluminium and galvanized materials should be spelled out as to what is/isn't permissible by the code. If this is not practical CMP should simply leave this as a design issue and only prohibit the 'worst offending' combinations such that the rule does not prohibit combinations in environments that may be acceptable.

If CMP is concerned about the electrical integrity of certain raceways of dissimilar metals perhaps a rule should be added generically requiring a 'wire type' EGC in such raceway installations.

This same change is being submitted for Article 342, 344, and 358

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3316-NFPA 70-2020 [Section No. 344.14]	Same language for RMC
Public Input No. 3319-NFPA 70-2020 [Section No. 358.14]	

Submitter Information Verification

Submitter Full Name: Chris Rettger
Organization:
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 07 22:03:50 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: Section 342.14 is provided to clarify when and what is acceptable as far as dissimilar metals. Non-metallic connections would not apply under section 342.14. The current information is clear on what dissimilar metals are acceptable to be used with one another.

Public Input No. 1274-NFPA 70-2020 [Sections 342.24, 342.26]

Sections 342.24, 342.26

342.24 ~~Bends —~~ Bends

(A) How Made.

~~Bends of IMC shall be so made that the conduit will not be damaged and the internal diameter of the conduit will not be effectively reduced. The radius of the curve of any field bend to the centerline of the conduit shall not be less than indicated in Table 2, Chapter 9.~~

~~**342.26** Bends —~~ (B) Number in One Run. ~~There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, for example, conduit bodies and boxes.~~

Statement of Problem and Substantiation for Public Input

Sections 342.24 and 342.26 have been combined into a single section for clarity and usability.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 28 10:19:31 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7583-NFPA 70-2020

Statement: This First Revision combines Sections 342.24 and 342.26 into a single Section for clarity and usability and clarifies the total degrees of bends permitted to be used in a conduit run between pull points

Public Input No. 3270-NFPA 70-2020 [Section No. 342.26]

342.26 Bends — Number in One Run.

There shall not be more than ~~the equivalent of four quarter bends (~~ 360 degrees ~~total)~~ of bend between pull points, for example, conduit bodies and boxes.

Statement of Problem and Substantiation for Public Input

The language "four quarter bends" is unnecessary and can lead to misapplication of the rule. There are cases where the inspection authority uses that term to say that bends exceeding 90 degrees are not permitted. In other cases code users say that you only count the "quarter bends" and not the kicks and offsets in the run. Neither of those interpretations are the intent of the rule. This language removes those possible misapplications of the rule, but is not a technical change. The rule, after the change, still prohibits runs that have more than 360 degrees of bend between pull points.\ which is the actual intent of the rule.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3271-NFPA 70-2020 [Section No. 344.26]	same change different raceway
Public Input No. 3273-NFPA 70-2020 [Section No. 352.26]	same change different raceway
Public Input No. 3274-NFPA 70-2020 [Section No. 353.26]	same change different raceway
Public Input No. 3275-NFPA 70-2020 [Section No. 355.26]	same change different raceway
Public Input No. 3276-NFPA 70-2020 [Section No. 358.26]	same change different raceway
Public Input No. 3271-NFPA 70-2020 [Section No. 344.26]	
Public Input No. 3273-NFPA 70-2020 [Section No. 352.26]	
Public Input No. 3274-NFPA 70-2020 [Section No. 353.26]	
Public Input No. 3275-NFPA 70-2020 [Section No. 355.26]	
Public Input No. 3276-NFPA 70-2020 [Section No. 358.26]	

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 07 13:38:07 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7583-NFPA 70-2020

Statement: This First Revision combines Sections 342.24 and 342.26 into a single Section for clarity and usability and clarifies the total degrees of bends permitted to be used in a conduit run between pull points

Public Input No. 1102-NFPA 70-2020 [New Section after 342.28]

TITLE OF NEW CONTENT 314.29 Double Locknuts.

Type your content here ...

Double locknuts shall be used per each enclosure opening that is not a threaded hub. Other fittings listed for the purpose may be used as the second locknut.

Statement of Problem and Substantiation for Public Input

present NEC language does not exist which would allow a nipple between two enclosures to use just one pair of locknuts, not two pair, to install the nipple. One pair per nipple does not ensure a god grounding path and can distort the enclosures out of shape. The second sentence recognizes something like a listed for the purpose ground bushing or grounding locknut that will effectively sandwich the enclosure wall.

Submitter Information Verification

Submitter Full Name:	Norman Feck
Organization:	State of Colorado
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Sat May 16 13:49:58 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: Section 250.97 includes the requirements for double locknuts when connecting to boxes and cabinets for over 250 volts. For voltages under 250 volts a single locknut would be permitted, no substantiation was provided to require double locknuts on the inside and outside of the box or cabinet. The requirements for mechanical and electrical continuity are covered under 300.10 and 300.12.

Public Input No. 2581-NFPA 70-2020 [Section No. 342.30(A)]

(A) Securely Fastened.

IMC shall be secured in accordance with one of the following:

(1) IMC shall be securely fastened within 900 mm (3 ft) of each outlet box, junction box, device box, cabinet, conduit body, or other conduit termination.

(2) Where structural members do not readily permit fastening within 900 mm (3 ft), fastening shall be permitted to be increased to a distance of 1.5 m (5 ft).

(3) Where approved, conduit shall not be required to be securely fastened within 900 mm (3 ft) of the service head for above-the-roof termination of a mast.

(4) Exception: For concealed work in finished buildings or prefinished wall panels where such securing is impracticable, unbroken lengths (without coupling) of EMT shall be permitted to be fished.

Statement of Problem and Substantiation for Public Input

Note that this PI is adding an exception, not list item (4).
There is no reason that IMC cannot be fished as currently permitted for EMT.

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 24 20:09:20 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7584-NFPA 70-2020

Statement: Where securing for concealed work in finished buildings or prefinished walls is impracticable, EMT and flexible conduits are permitted to be fished. This same practice would be acceptable for IMC.

Public Input No. 2003-NFPA 70-2020 [Section No. 342.42]

342.42 Couplings and Connectors.

(A) Threadless.

Threadless couplings and connectors used with conduit shall be made tight. Where buried in masonry or concrete, they shall be the concretetight type. Where installed in wet locations, they shall ~~comply with 314.15~~ ~~.~~ be listed for use in wet locations . Threadless couplings and connectors shall not be used on threaded conduit ends unless listed for the purpose.

(B) Running Threads.

Running threads shall not be used on conduit for connection at couplings.

Statement of Problem and Substantiation for Public Input

The rules in 314.15 that apply to wet locations require the fitting to be listed for use in a wet location. It would be so much better to have this requirement in this Article.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jul 24 16:58:24 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: There are additional requirements listed in Section 314.15 that should be referenced in addition to wet location listings. Wet location requirements for fittings are also required under other sections.

Public Input No. 1614-NFPA 70-2020 [New Section after 342.46]

342.44 Expansion Fittings.

Expansion fittings for IMC conduit shall be provided to compensate for thermal expansion and contraction where the length change is expected to be 6 mm (1⁄4 in.) or greater in a straight run between securely mounted items such as boxes, cabinets, elbows, or other conduit terminations. A nominal number for steel conduit can be determined by multiplying the expansion length in Table 352.44 by 0.20. A nominal number for aluminum conduit can be determined by multiplying the expansion length in Table 352.44 by 0.40.

Statement of Problem and Substantiation for Public Input

The new section is simply information that is contained in 300.7 Informational Note. However, it's not likely that anybody looking for the expansion rule will find it ... so having the actual requirement where it belongs will ensure that this important consider is applied.

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc

Street Address:

City:

State:

Zip:

Submittal Date: Wed Jun 24 13:00:29 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: Adding the requirements from Section 300.7 under a new section for IMC does not improve clarity or usability of the Code. Section 300.7(B) provides information for determining when expansion fittings are necessary to compensate for thermal expansion, deflection and contraction; however, there are several other situations where expansion fittings may be required, including, but not limited to, 300.4(H) Structural Joints and 300.5(J) earth movement. Also, Section 300.7 does not currently include requirements for expansion fittings when the length change is expected to be 6 mm (1/4 in.) or greater, there was no substantiation provided for adding these requirements

Public Input No. 1319-NFPA 70-2020 [Section No. 342.60]

342.60 Use as Equipment Grounding Conductor .

IMC shall be permitted as an equipment grounding conductor in accordance with 250 .118.

Statement of Problem and Substantiation for Public Input

According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not 'Grounding.'

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jun 01 13:52:35 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter's Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The grounding is not exclusive to Equipment Grounding Conductor. The Section is in place to address any grounding or bonding requirements. Section 250.118 does not have installation requirements for the equipment grounding conductors.

Public Input No. 4452-NFPA 70-2020 [Section No. 342.60]

342.60 Grounding.

IMC shall be permitted as an equipment grounding conductor. All homeruns to electrical equipment shall contain an insulated equipment grounding conductor to insure an effective ground fault current path over the life of the installation.

Statement of Problem and Substantiation for Public Input

In may cases the IMC raceways and fittings become loose, corroded or damaged thus the integrity of the ground fault return path is not compromised. Over the life of the IMC raceway installation the effective ground fault current path would be maintained if the EGC was installed. In many designs being done by engineering firms they are requiring the installation of the EGC. This also insures the electronic and digital equipment that is installed has the necessary grounding and bonding path maintained.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4463-NFPA 70-2020 [Section No. 344.60]	
Public Input No. 4470-NFPA 70-2020 [Section No. 358.60]	

Submitter Information Verification

Submitter Full Name: Wendell Whistler

Organization: IBEW Local 280

Street Address:

City:

State:

Zip:

Submittal Date: Thu Sep 10 13:18:56 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: IMC is permitted as an equipment grounding conductor per section 250.118. The submitter did not provide technical substantiation for requiring a supplemental insulated equipment grounding conductor.

Public Input No. 2903-NFPA 70-2020 [Section No. 344.2]

~~**344.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

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

~~A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.~~

Statement of Problem and Substantiation for Public Input

The definition for RMC was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2889-NFPA 70-2020 [New Definition after Definition: Conductor, Insulated.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:08:59 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3542-NFPA 70-2020 [Section No. 344.2]

(Relocate all definitions in the 344. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

344. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

Rigid Metal Conduit (RMC).

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

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:

Submittal Date: Tue Sep 08 21:53:48 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 1282-NFPA 70-2020 [Section No. 344.10]

344.10 Uses Permitted.

(A) Atmospheric Conditions and Occupancies.

(1) Galvanized Steel, Stainless Steel, and Red Brass RMC.

Galvanized steel, stainless steel, and red brass RMC shall be permitted under all atmospheric conditions and occupancies <u>including direct burial applications</u> .

(2) Aluminum RMC.

Aluminum RMC shall be permitted to be installed where approved for the environment. Rigid aluminum conduit encased in concrete or in direct contact with the earth <u>or direct burial applications</u> shall be provided with approved supplementary corrosion protection.

(3) Ferrous Raceways and Fittings.

Ferrous raceways and fittings protected from corrosion solely by enamel shall be permitted only indoors and in occupancies not subject to severe corrosive influences.

(B) Corrosive Environments.

(1) Galvanized Steel, Stainless Steel, and Red Brass RMC, Elbows, Couplings, and Fittings.

Galvanized steel, stainless steel, and red brass RMC elbows, couplings, and fittings shall be permitted to be installed in concrete, in direct contact with the earth, or in areas subject to severe corrosive influences where protected by corrosion protection approved for the condition.

(2) Supplementary Protection of Aluminum RMC.

Aluminum RMC shall be provided with approved supplementary corrosion protection where encased in concrete or in direct contact with the earth.

(C) Cinder Fill.

Galvanized steel, stainless steel, and red brass RMC shall be permitted to be installed in or under cinder fill where subject to permanent moisture where protected on all sides by a layer of noncinder concrete not less than 50 mm (2 in.) thick; where the conduit is not less than 450 mm (18 in.) under the fill; or where protected by corrosion protection approved for the condition.

(D) Wet Locations.

All supports, bolts, straps, screws, and so forth, shall be of corrosion-resistant materials or protected against corrosion by corrosion-resistant materials.

Informational Note: See 300.6 for protection against corrosion.

(E) Severe Physical Damage.

RMC shall be permitted to be installed where subject to severe physical damage.

Statement of Problem and Substantiation for Public Input

For clarity, RMC has always been permitted to be used in direct burial applications.

Submitter Information Verification

Submitter Full Name: Megan Hayes

Organization: Nema

Street Address:

City:
State:
Zip:
Submittal Date: Thu May 28 10:50:16 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7585-NFPA 70-2020

Statement: Additional text was added to 344.10(B)(1) and 344.10(B)(2) to clarify that RMC is permitted to be used in direct burial applications.

A comma was added after red brass RMC to make it clear that the uses permitted was not meant to apply to red brass elbows only.

Public Input No. 856-NFPA 70-2020 [Section No. 344.10(A)(1)]

(1) Galvanized Steel, Stainless Steel, and Red Brass RMC.

Galvanized steel, stainless steel, ~~and red~~ red brass RMC and elbows, couplings, and fittings shall be permitted under all atmospheric conditions and occupancies.

Statement of Problem and Substantiation for Public Input

The addition of "elbows, couplings, and fittings" harmonizes the language with 344.10(B) and makes it clear that these components are acceptable for use in all atmospheric conditions and occupancies.

Submitter Information Verification

Submitter Full Name: David Kendall

Organization: ABB Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Fri Apr 10 10:44:32 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: The submitter did not provide substantiation that there is confusion that RMC elbows, couplings and fittings are not permitted to be installed in all atmospheric conditions and occupancies.

Public Input No. 857-NFPA 70-2020 [Section No. 344.10(B)(1)]

(1) Galvanized Steel, Stainless Steel, and Red Brass RMC, Elbows, Couplings, and Fittings.

Galvanized steel, stainless steel, and red brass RMC,_ elbows, couplings, and fittings shall be permitted to be installed in concrete, in direct contact with the earth, or in areas subject to severe corrosive influences where protected by corrosion protection approved for the condition.

Statement of Problem and Substantiation for Public Input

Editorial. A comma is needed after RMC to make it clear that red brass RMC is acceptable for use and not only red brass RMC elbows.

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Fri Apr 10 10:47:07 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7585-NFPA 70-2020

Statement: Additional text was added to 344.10(B)(1) and 344.10(B)(2) to clarify that RMC is permitted to be used in direct burial applications.

A comma was added after red brass RMC to make it clear that the uses permitted was not meant to apply to red brass elbows only.

Public Input No. 3316-NFPA 70-2020 [Section No. 344.14]

344.14 ~~Dissimilar~~ 14 Dissimilar Metals.

Where practicable, dissimilar metals in contact anywhere in the raceway system shall be avoided to eliminate the possibility of galvanic action. Raceway system components made of the same material shall be permitted to be used together, additionally the following dissimilar metallic combinations may be used:

(1) **Stainless steel and aluminum fittings and enclosures shall be permitted to be used with**

~~galvanized steel RMC, and galvanized steel~~

(1) **RMC made of galvanized steel.**

(2) **Stainless steel and aluminum fittings and enclosures shall be permitted to be used with**

~~aluminum RMC where not subject to severe corrosive influences. Stainless steel rigid conduit shall only be used with the following:~~

- ~~Stainless steel fittings~~
- ~~Stainless steel boxes and enclosures~~

~~Steel (galvanized, painted, powder or PVC coated, and so forth) boxes and enclosures when~~

(1) **RMC made of stainless steel.**

(2) **Galvanized or stainless steel fittings and enclosures shall be permitted to be used with RMC made of aluminum where the dissimilar metal connection is not subject to severe corrosive influences**

~~Stainless steel, nonmetallic, or approved accessories~~

(1) ~~.~~

~~Note: Transitions of RMC to and from non-metallic materials are not prohibited by this section if permitted elsewhere in the code.~~

Statement of Problem and Substantiation for Public Input

The existing 2020 language in this section is written such to prohibit the use of stainless steel RMC with anything other than stainless RMC accessories. Not even non-metallic connections are permitted.

This section of the code should be clear that it only applies to the RMC fittings and raceways. If they happen to connect to a non-metallic enclosure that is already handled elsewhere in the code. The galvanic corrosion differences between stainless, aluminium and galvanized materials should be spelled out as to what is/isn't permissible by the code. If this is not practical CMP should simply leave this as a design issue and only prohibit the 'worst offending' combinations such that the rule does not prohibit combinations in environments that may be acceptable.

If CMP is concerned about the electrical integrity of certain raceways of dissimilar metals perhaps a rule should be added generically requiring a 'wire type' EGC in such raceway installations.

This same change is being submitted for Article 342, 344, and 358

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3318-NFPA 70-2020 [Section No. 342.14]	
Public Input No. 3319-NFPA 70-2020 [Section No. 358.14]	

Submitter Information Verification

Submitter Full Name: Chris Rettger
Organization:
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 07 21:12:41 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: Section 344.14 is provided to clarify when and what is acceptable as far as dissimilar metals. Non-metallic connections would not apply under section 344.14. The current information is clear on what dissimilar metals are acceptable to be used with one another.

Public Input No. 1285-NFPA 70-2020 [Sections 344.24, 344.26]

Sections 344.24, 344.26

344.24 ~~Bends —~~ Bends

(A) How Made.

~~Bends of RMC shall be so made that the conduit will not be damaged and so that the internal diameter of the conduit will not be effectively reduced. The radius of the curve of any field bend to the centerline of the conduit shall not be less than indicated in Table 2, Chapter 9.~~

~~**344.26** Bends —~~ (B) Number in One Run. ~~There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, for example, conduit bodies and boxes.~~

Statement of Problem and Substantiation for Public Input

Sections 344.24 and 344.26 have been combined into a single section for clarity and usability.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 28 11:07:05 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7588-NFPA 70-2020

Statement: This First Revision combines Sections 344.24 and 344.26 into a single section for clarity and usability and clarifies the total degrees of bends permitted to be used in a conduit run between pull points.

Public Input No. 3271-NFPA 70-2020 [Section No. 344.26]

344.26 Bends — Number in One Run.

There shall not be more than ~~the equivalent of four quarter bends (~~ 360 degrees ~~total)~~ of bend between pull points, for example, conduit bodies and boxes.

Statement of Problem and Substantiation for Public Input

The language "four quarter bends" is unnecessary and can lead to misapplication of the rule. There are cases where the inspection authority uses that term to say that bends exceeding 90 degrees are not permitted. In other cases code users say that you only count the "quarter bends" and not the kicks and offsets in the run. Neither of those interpretations are the intent of the rule. This language removes those possible misapplications of the rule, but is not a technical change. The rule, after the change, still prohibits runs that have more than 360 degrees of bend between pull points.\ which is the actual intent of the rule.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3270-NFPA 70-2020 [Section No. 342.26]	same change different raceway
Public Input No. 3273-NFPA 70-2020 [Section No. 352.26]	same change different raceway
Public Input No. 3274-NFPA 70-2020 [Section No. 353.26]	same change different raceway
Public Input No. 3275-NFPA 70-2020 [Section No. 355.26]	same change different raceway
Public Input No. 3276-NFPA 70-2020 [Section No. 358.26]	same change different raceway
Public Input No. 3270-NFPA 70-2020 [Section No. 342.26]	
Public Input No. 3273-NFPA 70-2020 [Section No. 352.26]	
Public Input No. 3274-NFPA 70-2020 [Section No. 353.26]	
Public Input No. 3275-NFPA 70-2020 [Section No. 355.26]	
Public Input No. 3276-NFPA 70-2020 [Section No. 358.26]	

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: [Not Specified]
Street Address:
City:
State:
Zip:

Submittal Date: Mon Sep 07 13:48:21 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7588-NFPA 70-2020

Statement: This First Revision combines Sections 344.24 and 344.26 into a single section for clarity and usability and clarifies the total degrees of bends permitted to be used in a conduit run between pull points.

Public Input No. 1103-NFPA 70-2020 [New Section after 344.28]

TITLE OF NEW CONTENT 344.29 Double Locknuts.

Type your content here ...

Double locknuts shall be used per each enclosure opening that is not a threaded hub. Other fittings listed for the purpose may serve as the second locknut.

Statement of Problem and Substantiation for Public Input

Present NEC language does not exist which would allow a nipple between two enclosures to use just one pair of locknuts, not two pair, to install the nipple. One pair per nipple does not ensure a good grounding path and can distort the enclosures out of shape. The second sentence recognizes something like a listed for the purpose ground bushing or grounding locknut that will effectively sandwich the enclosure wall.

Submitter Information Verification

Submitter Full Name: Norman Feck

Organization: State of Colorado

Street Address:

City:

State:

Zip:

Submittal Date: Sat May 16 14:05:03 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: Section 250.97 includes the requirements for double locknuts when connecting to boxes and cabinets for over 250 volts. For voltages under 250 volts a single locknut would be permitted, no substantiation was provided to require double locknuts on the inside and outside of the box or cabinet. The requirements for mechanical and electrical continuity are covered under 300.10 and 300.12.

Public Input No. 1286-NFPA 70-2020 [Section No. 344.28]

344.28 Reaming and Threading.

All cut ends shall be reamed or otherwise finished to remove rough edges. Where conduit is threaded in the field, a standard cutting die with a 1 in 16 taper (¾ in. taper per foot) shall be used. PVC coated RMC shall require approved threading and clamping methods to prevent damage to the exterior coating.

Informational Note 1 : See ANSI/ASME B1.20.1-2013, *Standard for Pipe Threads, General Purpose (Inch)*.

Informational Note 2: For further information on threading and clamping methods for RMC and PVC coated RMC, see NECA 101-2013, *Standard for Installing Steel Conduits (Rigid, IMC, EMT)*

Statement of Problem and Substantiation for Public Input

To avoid damage to the PVC coatings, the use of proper threading and clamping tools specially designed for PVC coated conduit shall be used. Standard threading and clamping tools which have not been modified will damage the coatings and shall not be used. NECA 101 was added to the section as an Information Note to guide the user to informative instructions.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 28 11:10:26 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7589-NFPA 70-2020

Statement: Damage to the exterior coating of PVC coated conduit can create unsafe conditions. In order to prevent damage during threading and bending the manufacturer's instruction for clamping shall be followed

Public Input No. 2582-NFPA 70-2020 [Section No. 344.30(A)]

(A) Securely Fastened.

RMC shall be secured in accordance with one of the following:

(1) RMC shall be securely fastened within 900 mm (3 ft) of each outlet box, junction box, device box, cabinet, conduit body, or other conduit termination.

(2) Fastening shall be permitted to be increased to a distance of 1.5 m (5 ft) where structural members do not readily permit fastening within 900 mm (3 ft).

(3) Where approved, conduit shall not be required to be securely fastened within 900 mm (3 ft) of the service head for above-the-roof termination of a mast.

Exception: For concealed work in finished buildings or prefinished wall panels where such securing is impracticable, unbroken lengths (without coupling) of EMT shall be permitted to be fished.

Statement of Problem and Substantiation for Public Input

EMT is permitted to be fished and installed without securement. There is no reason why this installation method should not also be permitted for RMC.

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 24 20:12:21 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7590-NFPA 70-2020

Statement: Where securing for concealed work in finished buildings or prefinished walls is impracticable, EMT and flexible conduits are permitted to be fished. This same practice would be acceptable for RMC

Public Input No. 2004-NFPA 70-2020 [Section No. 344.42]

344.42 Couplings and Connectors.

(A) Threadless.

Threadless couplings and connectors used with conduit shall be made tight. Where buried in masonry or concrete, they shall be the concrete tight type. Where installed in wet locations, they shall ~~comply with 314.15 .~~ shall be listed for use in wet locations . Threadless couplings and connectors shall not be used on threaded conduit ends unless listed for the purpose.

(B) Running Threads.

Running threads shall not be used on conduit for connection at couplings.

Statement of Problem and Substantiation for Public Input

The rules in 314.15 that apply to wet locations require the fitting to be listed for use in a wet location. It would be so much better to have this requirement in this Article.

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc

Street Address:

City:

State:

Zip:

Submittal Date: Fri Jul 24 16:59:54 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: There are additional requirements listed in Section 314.15 that should be referenced in addition to wet location listings. Wet location requirements for fittings are also required under other sections.

Public Input No. 1615-NFPA 70-2020 [New Section after 344.46]

344.44 Expansion Fittings.

Expansion fittings for RMC shall be provided to compensate for thermal expansion and contraction where the length change is expected to be 6 mm (1⁄4 in.) or greater in a straight run between securely mounted items such as boxes, cabinets, elbows, or other conduit terminations. A nominal number for steel conduit can be determined by multiplying the expansion length in Table 352.44 by 0.20. A nominal number for aluminum conduit can be determined by multiplying the expansion length in Table 352.44 by 0.40.

Statement of Problem and Substantiation for Public Input

The new section is simply information that is contained in 300.7 Informational Note. However, it's not likely that anybody looking for the expansion rule will find it ... so having the actual requirement where it belongs will ensure that this important consider is applied.

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc

Street Address:

City:

State:

Zip:

Submittal Date: Wed Jun 24 13:06:14 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: Adding the requirements from Section 300.7 under a new section for RMC does not improve clarity or usability of the Code. Section 300.7(B) provides information for determining when expansion fittings are necessary to compensate for thermal expansion, deflection and contraction; however, there are several other situations where expansion fittings may be required including, but not limited to, 300.4(H) Structural Joints and 300.5(J) earth movement. Also, Section 300.7 does not currently include requirements for expansion fittings when the length change is expected to be 6 mm (1/4 in.) or greater, there was no substantiation provided for adding these requirements.

Public Input No. 1320-NFPA 70-2020 [Section No. 344.60]

344.60 Use as Equipment Grounding Conductor .

RMC shall be permitted as an equipment grounding conductor in accordance with 250 .118.

Statement of Problem and Substantiation for Public Input

According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about 'Grounding.' Also providing the NEC reference to 250.118 is greatly needed for the industry.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 01 13:55:06 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter's Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The grounding is not exclusive to Equipment Grounding Conductor. The Section is in place to address any grounding or bonding requirements. Section 250.118 does not have installation requirements for the equipment grounding conductors.

Public Input No. 4463-NFPA 70-2020 [Section No. 344.60]

344.60 Grounding.

RMC shall be permitted as an equipment grounding conductor. All homeruns to electrical equipment shall contain an insulated equipment grounding conductor to insure an effective groundfault path over the life of the installation.

Statement of Problem and Substantiation for Public Input

In may cases the RMC raceways and fittings become loose, corroded or damaged thus the integrity of the ground fault return path is not compromised. Over the life of the RMC raceway installation the effective ground fault current path would be maintained if the EGC was installed. In many designs being done by engineering firms they are requiring the installation of the EGC. This also insures the electronic and digital equipment that is installed has the necessary grounding and bonding path maintained.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4452-NFPA 70-2020 [Section No. 342.60]	
Public Input No. 4470-NFPA 70-2020 [Section No. 358.60]	

Submitter Information Verification

Submitter Full Name: Wendell Whistler

Organization: IBEW Local 280

Street Address:

City:

State:

Zip:

Submittal Date: Thu Sep 10 13:32:13 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: RMC is permitted as an equipment grounding conductor per section 250.118. The submitter did not provide technical substantiation for requiring a supplemental insulated equipment grounding conductor.

Public Input No. 2906-NFPA 70-2020 [Section No. 348.2]

~~**348.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

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

~~A raceway of circular cross section made of helically wound, formed, interlocked metal strip.~~

Statement of Problem and Substantiation for Public Input

The definition for FMC was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2889-NFPA 70-2020 [New Definition after Definition: Conductor, Insulated.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:11:04 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3544-NFPA 70-2020 [Section No. 348.2]

(Relocate all definitions in the 348. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

348. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

Flexible Metal Conduit (FMC).

A raceway of circular cross section made of helically wound, formed, interlocked metal strip.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 21:55:52 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 2330-NFPA 70-2020 [New Section after 348.6]

348.8 Reconditioning

FMC shall not be permitted to be reconditioned.

Statement of Problem and Substantiation for Public Input

This revision is needed to clarify that listed Flexible Metal Conduit is not intended to be reconditioned.

Submitter Information Verification

Submitter Full Name:	Brian Deacy
Organization:	Atkore International
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Fri Aug 14 15:28:21 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution:	FR-7552-NFPA 70-2020
Statement:	This First Revision adds a new Section 348.8 and clarifies that FMC cannot be reconditioned per NEMA CS100-2020.

Public Input No. 1287-NFPA 70-2020 [Sections 348.24, 348.26]

Sections 348.24, 348.26

348.24 ~~Bends —~~ Bends

(A) How Made.

~~Bends in conduit shall be made so that the conduit is not damaged and the internal diameter of the conduit is not effectively reduced. Bends shall be permitted to be made manually without auxiliary equipment. The radius of the curve to the centerline of any bend shall not be less than shown in Table 2, Chapter 9 using the column "Other Bends."~~

~~**348.26** Bends —~~ (B) Number in One Run. ~~There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, for example, conduit bodies and boxes.~~

Statement of Problem and Substantiation for Public Input

Sections 348.24 and 348.26 have been combined into a single section for clarity and usability.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 28 11:15:46 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7553-NFPA 70-2020

Statement: This First Revision combines Sections 348.24 and 348.26 into a single Section for clarity and usability and clarifies the number of degrees of bends permitted to be used in a conduit run between pull points.

Public Input No. 1288-NFPA 70-2020 [Section No. 348.30]

348.30 Securing and Supporting.

FMC shall be securely fastened in place and supported in accordance with 348.30(A) and (B).

(A) Securely Fastened.

FMC shall be securely fastened in place by an approved means within 300 mm (12 in.) of each box, cabinet, conduit body, or other conduit termination and shall be supported and secured at intervals not to exceed 1.4 m (4½ ft). Where used, cable ties shall be listed and be identified for securement and support.

Exception No. 1: Where FMC is fished between access points through concealed spaces in finished buildings or structures and supporting is impracticable.

Exception No. 2: Where flexibility is necessary after installation, lengths from the last point where the raceway is securely fastened shall not exceed the following:

(1) 900 mm (3 ft) for metric designators 16 through 35 (trade sizes ½ through 1¼)

(2) 1200 mm (4 ft) for metric designators 41 through 53 (trade sizes 1½ through 2)

(3) 1500 mm (5 ft) for metric designators 63 (trade size 2½) and larger

Exception No. 3: Lengths not exceeding 1.8 m (6 ft) from a luminaire terminal connection for tap connections to luminaires as permitted in 410.117(C).

Exception No. 4: Lengths not exceeding 1.8 m (6 ft) from the last point where the raceway is securely fastened for connections within an accessible ceiling to a luminaire(s) or other equipment. For the purposes of ~~this exception, listed flexible metal conduit fittings~~ 348.30, listed FMC fittings shall be permitted as a means of securement and support.

(B) Supports.

Horizontal runs of FMC supported by openings through framing members at intervals not greater than 1.4 m (4½ ft) and securely fastened within 300 mm (12 in.) of termination points shall be permitted.

Statement of Problem and Substantiation for Public Input

Exception 4 of 348.30(A) was revised to harmonized with the language of 350.30(A) Exception 4.

Submitter Information Verification

Submitter Full Name: Megan Hayes

Organization: Nema

Street Address:

City:

State:

Zip:

Submittal Date: Thu May 28 11:19:03 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7554-NFPA 70-2020

Statement: This First Revision harmonizes the language with 350.30(A) and clarifies that Listed FMC Fittings are permitted as the means of securement and support for the exceptions.

Public Input No. 1221-NFPA 70-2020 [Section No. 348.30(A)]

(A) Securely Fastened.

FMC shall be securely fastened in place by an approved means within 300 mm (12 in.) of each box, cabinet, conduit body, or other conduit termination and shall be supported and secured at intervals not to exceed 1.4 m (4½ ft). Where used, cable ties shall be listed and be identified for securement and support.

Exception No. 1: Where FMC is fished between access points through concealed spaces in finished buildings or structures and supporting is impracticable. For the purposes of this exception, listed flexible metal conduit fittings shall be permitted as a means of securement and support.

Exception No. 2: Where flexibility is necessary after installation, lengths from the last point where the raceway is securely fastened shall not exceed the following:

(1) 900 mm (3 ft) for metric designators 16 through 35 (trade sizes ½ through 1¼)

(2) 1200 mm (4 ft) for metric designators 41 through 53 (trade sizes 1½ through 2)

(3) 1500 mm (5 ft) for metric designators 63 (trade size 2½) and larger

Exception No. 3: Lengths not exceeding 1.8 m (6 ft) from a luminaire terminal connection for tap connections to luminaires as permitted in 410.117(C).

Exception No. 4: Lengths not exceeding 1.8 m (6 ft) from the last point where the raceway is securely fastened for connections within an accessible ceiling to a luminaire(s) or other equipment. For the purposes of this exception, listed flexible metal conduit fittings shall be permitted as a means of securement and support.

Statement of Problem and Substantiation for Public Input

Suggested language will ensure that securement and support is achieved through the use of listed fittings. The requirement largely mirrors the overall requirement in Exception 4.

Submitter Information Verification

Submitter Full Name: Gary Hein

Organization: Submission is independent of employer.

Street Address:

City:

State:

Zip:

Submittal Date: Sat May 23 10:30:05 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7554-NFPA 70-2020

Statement: This First Revision harmonizes the language with 350.30(A) and clarifies that Listed FMC Fittings are permitted as the means of securement and support for the exceptions.

Public Input No. 1222-NFPA 70-2020 [Section No. 348.30(A)]

(A) Securely Fastened.

FMC shall be securely fastened in place by an approved means within 300 mm (12 in.) of each box, cabinet, conduit body, or other conduit termination and shall be supported and secured at intervals not to exceed 1.4 m (4½ ft). Where used, cable ties shall be listed and be identified for securement and support.

Exception No. 1: Where FMC is fished between access points through concealed spaces in finished buildings or structures and supporting is impracticable.

Exception No. 2: Where flexibility is necessary after installation, lengths from the last point where the raceway is securely fastened shall not exceed the following:

(1) 900 mm (3 ft) for metric designators 16 through 35 (trade sizes ½ through 1¼)

(2) 1200 mm (4 ft) for metric designators 41 through 53 (trade sizes 1½ through 2)

(3) 1500 mm (5 ft) for metric designators 63 (trade size 2½) and larger

Exception No. 3: Lengths not exceeding 1.8 m (6 ft) from a luminaire terminal connection for tap connections to luminaires as permitted in 410.117(C).

Exception No. 4: Lengths not exceeding 1.8 m (6 ft) from the last point where the raceway is securely fastened for connections within an accessible ceiling to a luminaire(s) or other equipment. For the purposes of this exception, listed flexible metal conduit fittings shall be permitted as a means of securement and support.

Exception No. 5: For the purposes of the exceptions, listed FMC fittings shall be permitted as a means of securement and support.

Statement of Problem and Substantiation for Public Input

Add language that is the same or similar to what is used following Article 350.30 (A). This change will add clarity and consistency to similar wiring methods.

Submitter Information Verification

Submitter Full Name: Gary Hein
Organization: Submission is independent of employer.
Street Address:
City:
State:
Zip:
Submittal Date: Sat May 23 10:37:02 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7554-NFPA 70-2020
Statement: This First Revision harmonizes the language with 350.30(A) and clarifies that Listed FMC Fittings are permitted as the means of securement and support for the exceptions.

Public Input No. 2583-NFPA 70-2020 [Section No. 348.30(A)]

(A) Securely Fastened.

FMC shall be securely fastened in place by an approved means within 300 mm (12 in.) of each box, cabinet, conduit body, or other conduit termination and shall be supported and secured at intervals not to exceed 1.4 m (4½ ft). Where used, cable ties shall be listed and be identified for securement and support.

Exception No. 1: Where FMC is fished between access points through concealed spaces in finished buildings or structures and supporting is impracticable.

Exception No. 2: Where flexibility is necessary after installation, lengths from the last point where the raceway is securely fastened shall not exceed the following:

(1) 900 mm (3 ft) for metric designators 16 through 35 (trade sizes ½ through 1¼)

(2) 1200 mm (4 ft) for metric designators 41 through 53 (trade sizes 1½ through 2)

(3) 1500 mm (5 ft) for metric designators 63 (trade size 2½) and larger

Exception No. 3: Lengths not exceeding 1.8 m (6 ft) from a luminaire terminal connection for tap connections to luminaires as permitted in 410.117(C).

Exception No. 4: Lengths not exceeding 1.8 m (6 ft) from the last point where the raceway is securely fastened for connections within an accessible ceiling to a luminaire(s) or other equipment.

For the purposes of ~~this exception~~ the exceptions , listed ~~flexible metal conduit~~ FMC fittings shall be permitted as a means of securement and support.

Statement of Problem and Substantiation for Public Input

This PI just makes the exceptions for the support of FMC consistent with the exceptions for LFMC. There is no reason to treat one differently from the other.

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 24 20:16:49 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7554-NFPA 70-2020

Statement: This First Revision harmonizes the language with 350.30(A) and clarifies that Listed FMC Fittings are permitted as the means of securement and support for the exceptions.

Public Input No. 1322-NFPA 70-2020 [Section No. 348.60]

348.60 Use as Equipment Grounding ~~and Bonding~~ Conductor .

If used to connect equipment where flexibility is necessary to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, an equipment grounding conductor shall be installed.

Where flexibility is not required after installation, FMC shall be permitted to be used as an equipment grounding conductor when installed in accordance with 250.118(5).

Where required or installed, equipment grounding conductors shall be installed in accordance with 250.134.

Where required or installed, equipment bonding jumpers shall be installed in accordance with 250.102.

Statement of Problem and Substantiation for Public Input

According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about 'Grounding and Bonding.'

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jun 01 13:58:45 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter’s Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The intent of this section is to address grounding in general which may include EGC purposes and other grounding and bonding needs

Public Input No. 2129-NFPA 70-2020 [Section No. 348.60]

348.60 Grounding and Bonding. Where required or installed below, equipment grounding conductors shall be installed in accordance with 250.134, and equipment bonding jumpers shall be installed in accordance with 250.102 .

(A) Flexibility Required. If used to connect equipment where flexibility is necessary to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, an equipment grounding conductor ~~shall~~ or external bonding jumper with fittings listed for grounding shall be installed.

(B) Flexibility Not Required. Where flexibility is not required after installation, FMC shall be permitted to be used as an equipment grounding conductor when installed in accordance with 250.118(5).

~~Where required or installed, equipment grounding conductors shall be installed in accordance with 250.134 .~~

~~Where required or installed, equipment bonding jumpers shall be installed~~ **(C) Hazardous (Classified) Locations.** In hazardous locations, regardless of voltage or raceway flexibility, an equipment grounding conductor or external bonding jumper of the wire type with fittings listed for grounding shall be installed. in accordance with 250. ~~102~~ 100 .

Statement of Problem and Substantiation for Public Input

This is a companion proposal to one being submitted to revise 250.100 and several other sections.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1252-NFPA 70-2020 [Section No. 250.100]	
Public Input No. 2124-NFPA 70-2020 [Section No. 501.30]	
Public Input No. 2125-NFPA 70-2020 [Section No. 502.30]	
Public Input No. 2126-NFPA 70-2020 [Section No. 503.30]	
Public Input No. 2127-NFPA 70-2020 [Section No. 505.25]	
Public Input No. 1252-NFPA 70-2020 [Section No. 250.100]	
Public Input No. 2130-NFPA 70-2020 [Section No. 350.60]	
Public Input No. 2131-NFPA 70-2020 [Section No. 506.25]	
Public Input No. 2132-NFPA 70-2020 [Section No. 250.118]	

Submitter Information Verification

Submitter Full Name: Paul Guidry
Organization: Fluor Enterprises, Inc.
Affiliation: Associated Builders and Contractors
Street Address:
City:
State:
Zip:
Submittal Date: Sun Aug 02 12:20:11 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: The Hazardous (Classified) Locations requirements for FMC is outside the purview of CMP-8 and belongs in Chapter 5 with the technical committee members of CMP-14. The additional proposed language is confusing since FMC is an approved Equipment Grounding Conductor (EGC) and the proposed language reads as if an additional EGC is required

Public Input No. 2908-NFPA 70-2020 [Section No. 350.2]

~~**350.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

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

~~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.~~

Statement of Problem and Substantiation for Public Input

The definition for LFMC was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2889-NFPA 70-2020 [New Definition after Definition: Conductor, Insulated.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:12:38 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3545-NFPA 70-2020 [Section No. 350.2]

(Relocate all definitions in the 350. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

350. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

Liquidtight Flexible Metal Conduit (LFMC).

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.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 21:57:30 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 2331-NFPA 70-2020 [New Section after 350.6]

350.8 Reconditioning

LFMC shall not be permitted to be reconditioned.

Statement of Problem and Substantiation for Public Input

This revision is needed to clarify that listed Liquidtight Flexible Metal Conduit is not intended to be reconditioned.

Submitter Information Verification

Submitter Full Name:	Brian Deacy
Organization:	Atkore International
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Fri Aug 14 15:29:30 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7556-NFPA 70-2020

Statement: This First Revision adds a new Section 350.8 and clarifies that LFMC cannot be reconditioned per NEMA CS100-2020.

Public Input No. 2334-NFPA 70-2020 [Section No. 350.10]

350.10 Uses Permitted.

LFMC shall be permitted to be used in exposed or concealed locations as follows:

(1) Where conditions of installation, operation, or maintenance require flexibility or protection from machine oils, liquids, vapors, or solids.

(2) In hazardous (classified) locations where specifically permitted by Chapter 5.

(3) For direct burial where listed and marked for the purpose.

(4) Conductors or cables rated at a temperature higher than the listed temperature rating of LFMC conduit shall be permitted to be installed in LFMC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFMC~~ per 110~~ . ~~14(C).~~

Statement of Problem and Substantiation for Public Input

Reference to 110.14(C) should be deleted.
The use of 110.14(C) is a termination limitation rule. It should not be applied to the overall span of the wiring method not related to the terminal limitations given in 110.14(C). The span between termination points are frequently utilized at the highest insulation temperature ratings for various adjustments and corrections as stipulated in 310.15(B) and 31015(C) and as a result the subsequent current (ampere) permitted on a conductor will be adjusted accordingly.

Submitter Information Verification

Submitter Full Name: Brian Deacy
Organization: Atkore International
Street Address:
City:
State:
Zip:

Submittal Date: Fri Aug 14 15:32:59 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7623-NFPA 70-2020

Statement: This First Revision removes the reference to 110.14(C) since it is not applicable to the temperature rating of the LFMC.

Public Input No. 4064-NFPA 70-2020 [Section No. 350.10]

350.10 Uses Permitted.

LFMC shall be permitted to be used in exposed or concealed locations as follows:

(1) Where conditions of installation, operation, or maintenance require flexibility or protection from machine oils, liquids, vapors, or solids.

(2) In hazardous (classified) locations where specifically permitted by Chapter 5.

(3) For direct burial where listed and marked for the purpose.

(4) Conductors or cables rated at a temperature higher than the listed temperature rating of LFMC conduit shall be permitted to be installed in LFMC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFMC per 110.14(C).

(5) In cable trays.

Statement of Problem and Substantiation for Public Input

Propose to "In cable trays" to complete the Uses Permitted and to line up with 392.10(A) and Table 392.10(A).

Submitter Information Verification

Submitter Full Name: Mathher Abbassi
Organization: New York City Department Of Buildings
Street Address:
City:
State:
Zip:

Submittal Date: Wed Sep 09 19:42:49 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: LFMC is already permitted to be used in a cable tray system per 392.10(A) it is not necessary to repeat the rule in 350.10. This is consistent with other approved conduits for cable tray system whereas they do not have a section under Uses Permitted for cable tray systems.

Public Input No. 4433-NFPA 70-2020 [Section No. 350.10]

350.10 Uses Permitted.

LFMC shall be permitted to be used in exposed or concealed locations as follows:

(1) Where conditions of installation, operation, or maintenance require flexibility or protection from machine oils, liquids, vapors, or solids.

(2) In hazardous (classified) locations where specifically permitted by Chapter 5.

(3) For direct burial where listed and marked for the purpose.

(4) Conductors or cables rated at a temperature higher than the listed temperature rating of LFMC conduit shall be permitted to be installed in LFMC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFMC~~ per 110~~ . ~~14(C).~~

Statement of Problem and Substantiation for Public Input

The connection of 110.14(C) to the allowable operating temperature for conductors installed within LFMC is technically erroneous and results in a dangerous cancellation of the entire requirement. The operating temperature results from current flow over the resistance presented by a conductor, in the context of both mutual conductor heating to the extent present, and the ambient temperature. That temperature is a characteristic of the middle of a wire, and has absolutely nothing to do with how a termination will behave at the end of a wire, as regulated by 110.14(C).

The default UL Guide Card (DXHR) operating temperature limit for LFMC is 60°C. The default temperature limit in 110.14(C) for terminations of large circuits (>100A; >1 AWG wires) and the limit for most motor circuits (an extremely common application for LFMC) is 75°C. This creates a direct conflict between 110.3(B) (usually requires 60°C) and this new 2020 NEC requirement (usually allows 75°C). This amendment will line this requirement up with comparable requirements in 352.10(I), 356.10(8) (new for the 2020 NEC), and 362.10(9), none of which make an association with 110.14(C).

Submitter Information Verification

Submitter Full Name: Frederic Hartwell

Organization: Hartwell Electrical Services, Inc.

Affiliation: self

Street Address:

City:

State:

Zip:

Submittal Date: Thu Sep 10 12:59:46 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7623-NFPA 70-2020

Statement: This First Revision removes the reference to 110.14(C) since it is not applicable to the temperature rating of the LFMC.

Public Input No. 1289-NFPA 70-2020 [Sections 350.24, 350.26]

Sections 350.24, 350.26

350.24 ~~Bends —~~ Bends

(A) How Made.

~~– Bends in conduit shall be so made that the conduit will not be damaged and the internal diameter of the conduit will not be effectively reduced. Bends shall be permitted to be made manually without auxiliary equipment. The radius of the curve to the centerline of any bend shall not be less than required in Table 2, Chapter 9 using the column "Other Bends."~~

~~**350.26** Bends —~~ (B) Number in One Run. ~~– There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, for example, conduit bodies and boxes.~~

Statement of Problem and Substantiation for Public Input

Sections 350.24 and 350.26 have been combined into a single section for clarity and usability.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:

Submittal Date: Thu May 28 11:22:50 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7558-NFPA 70-2020

Statement: This First Revision combines Sections 350.24 and 350.26 into a single Section for clarity and usability and clarifies the number of degrees of bends permitted to be used in a conduit run between pull points.

Public Input No. 1323-NFPA 70-2020 [Section No. 350.60]

350.60 Use as Equipment Grounding ~~and Bonding~~ Conductor .

If used to connect equipment where flexibility is necessary to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, an equipment grounding conductor shall be installed.

Where flexibility is not required after installation, LFMC shall be permitted to be used as an equipment grounding conductor when installed in accordance with 250.118(6).

Where required or installed, equipment grounding conductors shall be installed in accordance with 250.134.

Where required or installed, equipment bonding jumpers shall be installed in accordance with 250.102.

Informational Note: See 501.30(B), 502.30(B), 503.30(B), 505.25(B), and 506.25(B) for types of equipment grounding conductors.

Statement of Problem and Substantiation for Public Input

According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about 'Grounding.'

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 01 14:04:47 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter’s Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The intent of this section is to address grounding in general which may include EGC purposes and other grounding and bonding needs.

Public Input No. 2130-NFPA 70-2020 [Section No. 350.60]

350.~~60~~ 60 Grounding and Bonding. Where required or installed below, equipment grounding conductors shall be installed in accordance with 250.134, and equipment bonding jumpers shall be installed in accordance with 250.102 .

(A) Flexibility Required. If used to connect equipment where flexibility is necessary to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, an equipment grounding conductor

~~shall~~

or external bonding jumper with fittings listed for grounding shall be installed.

(B) Flexibility Not Required. Where flexibility is not required after installation,

~~LFMC~~

FMC shall be permitted to be used as an equipment grounding conductor when installed in accordance with 250.118(

~~6~~

5) .

~~Where required or installed, equipment grounding conductors shall be installed in accordance with 250.134 .~~

~~Where required or installed, equipment bonding jumpers shall be installed~~

(C) Hazardous (Classified) Locations. In hazardous locations, regardless of voltage or raceway flexibility, an equipment grounding conductor or external bonding jumper of the wire type with fittings listed for grounding shall be installed. in accordance with 250.

~~102.~~

> ~~Informational Note: See 501.30(B) , 502.30(B) , 503.30(B) , 505.25(B) , and 506.25(B) for types of equipment grounding conductors.~~

100.

Statement of Problem and Substantiation for Public Input

This is a companion proposal to one being submitted for the revision of Section 250.100 and several other sections.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1252-NFPA 70-2020 [Section No. 250.100]	
Public Input No. 2124-NFPA 70-2020 [Section No. 501.30]	
Public Input No. 2125-NFPA 70-2020 [Section No. 502.30]	
Public Input No. 2126-NFPA 70-2020 [Section No. 503.30]	
Public Input No. 2127-NFPA 70-2020 [Section No. 505.25]	
Public Input No. 2129-NFPA 70-2020 [Section No. 348.60]	
Public Input No. 1252-NFPA 70-2020 [Section No. 250.100]	
Public Input No. 2131-NFPA 70-2020 [Section No. 506.25]	
Public Input No. 2132-NFPA 70-2020 [Section No. 250.118]	

Submitter Information Verification

Submitter Full Name: Paul Guidry
Organization: Fluor Enterprises, Inc.
Affiliation: Associated Builders and Contractors
Street Address:
City:
State:
Zip:
Submittal Date: Sun Aug 02 12:36:13 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: The Hazardous (Classified) Locations requirements for LFMC is outside the purview of CMP-8 and belongs in Chapter 5 with the technical committee members of CMP-14. The additional proposed language is confusing since LFMC is an approved Equipment Grounding Conductor (EGC) and the proposed language reads as if an additional EGC is required.

Public Input No. 3857-NFPA 70-2020 [Section No. 352.1]

352.1 Scope.

This article covers the use, installation, and construction specifications for rigid polyvinyl chloride conduit (PVC) and associated fittings.

Informational Note: ~~Refer to Article~~ ~~353~~ See 353.1 for High Density Polyethylene Conduit: Type HDPE, and ~~Article~~ 355.1 for Reinforced Thermosetting Resin Conduit: Type RTRC.

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the 2020 NEC(r) Style Manual prohibits reference to an entire article, other than Article 100. As such, it is proposed to revise these references to the scope of the respective articles and the informational note is reorganized in accordance with Section 4.1.3 of the NEC(r) Style Manual.

Submitter Information Verification

Submitter Full Name: Richard Holub
Organization: The DuPont Company, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 14:04:56 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7559-NFPA 70-2020

Statement: This First Revision deletes the Informational Note in 352.1 since it is no longer needed. The Informational Note was useful when the nonmetallic conduits separated into individual Articles several cycles ago. The new Articles for different nonmetallic conduits are now well established. By deleting the Informational Note, 352.1 is now compliant with the 2020 NEC Style Manual, Section 4.1.4.

Note to the Correlating Committee; A revision was made to the Scope of PVC Conduit.

Public Input No. 2910-NFPA 70-2020 [Section No. 352.2]

~~**352.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

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

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

Statement of Problem and Substantiation for Public Input

The definition for RNC was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2889-NFPA 70-2020 [New Definition after Definition: Conductor, Insulated.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:14:10 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3547-NFPA 70-2020 [Section No. 352.2]

(Relocate all definitions in the 352. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

352. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

Rigid Polyvinyl Chloride Conduit (PVC).

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

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams

Organization: Delta Charter Township

Street Address:

City:

State:

Zip:

Submittal Date: Tue Sep 08 22:00:12 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 2167-NFPA 70-2020 [New Section after 352.10]

TITLE OF NEW CONTENT

(B) Encased in Concrete. RNC shall be permitted to be encased in concrete floors, ceilings, walls, and slabs.

Statement of Problem and Substantiation for Public Input

This Public Input is for clarity. This Public Input adds a new 352.10(B) to indicate that RNC is permitted to be encased in concrete floors, ceilings, walls and slabs. It surprises me that the Code didn't already have this permission in it since it was the common installation practice since RNC's introduction.

Submitter Information Verification

Submitter Full Name:	David Kendall
Organization:	ABB Inc.
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Thu Aug 06 09:59:51 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution:	FR-7561-NFPA 70-2020
Statement:	This First Revision adds a new section 352.10(B) to clarify that PVC Conduit is permitted to be encased in concrete. Sections are renumbered accordingly

Public Input No. 873-NFPA 70-2020 [Section No. 352.10(F)]

(F) Exposed.

PVC conduit shall be permitted for exposed work.~~ PVC conduit used exposed in areas of physical damage shall be identified for the use.~~

~~Informational Note: PVC Conduit, Type Schedule 80, is identified for areas of physical damage.~~

Statement of Problem and Substantiation for Public Input

352.10(F) was revised to coordinate with the proposed new section 352.10(J) that clarifies that Schedule 80 PVC Conduit and elbows are acceptable for use in areas of physical damage. It also clarifies that the fittings used with PVC conduit are acceptable for use with Schedule 80 PVC conduit in areas of physical damage. PVC Fittings are listed to UL651 for use with both Schedule 40 and Schedule 80 PVC conduit.

A separate Public Input will be submitted to add a new section 352.10(J) and 352.12(C) to make reference to the new section.

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Fri Apr 17 09:42:09 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7562-NFPA 70-2020

Statement: This First Revision revises 352.10(F) for clarification and usability. This First Revision correlates with the new section 352.10(J) and 352.12(C).

Public Input No. 858-NFPA 70-2020 [New Section after 352.10(I)]

TITLE OF NEW CONTENT

(J) Physical Damage. Type Schedule 80 PVC conduit and elbows shall be permitted to be installed where subject to physical damage. PVC fittings listed for PVC conduit shall be permitted to be installed where subject physical damage.

Statement of Problem and Substantiation for Public Input

Adding the new section 352.10(J) clarifies that Schedule 80 PVC Conduit and elbows are acceptable for use in areas of physical damage. It also clarifies that the fittings used with PVC conduit are acceptable for use with Schedule 80 PVC conduit in areas of physical damage. PVC Fittings are listed to UL651 for use with both Schedule 40 and Schedule 80 PVC conduit.

A separate Public Input will be submitted to 352.10(F) for removal of text and 352.12(C) to make reference to this section.

Submitter Information Verification

Submitter Full Name: David Kendall

Organization: ABB Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Fri Apr 10 10:50:25 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7563-NFPA 70-2020

Statement: This First Revision adds a new section 352.10(J) and informational note for clarification and usability. This new section makes it clear that Schedule 80 PVC Conduit and Schedule 80 PVC Conduit elbows are acceptable for areas of Physical Damage and that listed PVC Conduit fittings are used. This First Revision correlates with the sections 352.10(F) and 352.12(C).

Public Input No. 2939-NFPA 70-2020 [Section No. 352.12(C)]

(C) Physical Damage.

Where subject to physical damage unless identified for such use.

Information Note: Listed Type PVC Schedule 80 Conduit is identified for use in areas of physical damage.

Statement of Problem and Substantiation for Public Input

A new information note was added to 352.12(C) for clarity and usability. Rigid Polyvinyl Chloride (PVC) Type Schedule 80 conduit is listed for areas of physical damage.

Submitter Information Verification

Submitter Full Name:	Megan Hayes
Organization:	Nema
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Thu Sep 03 13:13:16 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7567-NFPA 70-2020

Statement: This First Revision revises 352.12(C) for clarification and usability. This First Revision correlates with the new section 352.10(J) and 352.10(F).

Public Input No. 859-NFPA 70-2020 [Section No. 352.12(C)]

(C) Physical Damage.

Where subject to physical damage~~ unless identified for such use.~~ , expected as permitted by 352.10(J).

Statement of Problem and Substantiation for Public Input

352.12(C) was revised in conjunction with the Public Input for a new section 352.10(J). Adding the new section 352.10(J) clarifies that Schedule 80 PVC Conduit and elbows are acceptable for use in areas of physical damage. It also clarifies that the fittings used with PVC conduit are acceptable for use with Schedule 80 PVC conduit in areas of physical damage. PVC Fittings are listed to UL651 for use with both Schedule 40 and Schedule 80 PVC conduit.

A separate Public Input will be submitted to create a new section 352.10(J) and to revise 352.10(F).

Submitter Information Verification

Submitter Full Name:	David Kendall
Organization:	ABB Inc.
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Fri Apr 10 11:06:57 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7567-NFPA 70-2020

Statement: This First Revision revises 352.12(C) for clarification and usability. This First Revision correlates with the new section 352.10(J) and 352.10(F).

Public Input No. 1105-NFPA 70-2020 [New Section after 352.12(E)]

TITLE OF NEW CONTENT 352.12(F) Southern Exposure.

Type your content here ...

On the south exterior of buildings or structures where subject to the sun's rays and within 40 degrees of due south.

Exception: Southern exposed PVC shall be allowed when the conduit has 10' of free air on all sides of the conduit other than the supports for the conduit.

Statement of Problem and Substantiation for Public Input

I've found these conduits baked and toasted in one summer season. If the conduits were installed in this manner due to being bent with a PVC oven for too long, the installation could be called a code violation for installing damaged product. 110.3A2, 110.3B, 110.12B, and 110.13B could almost be quoted as articles saying southern exposed PVC is a present violation but are long shots to pointing at this practice as a code violation.

These conduits are stamped 'Sunlight Resistant' not 'Sunlight Proof'.

As written, exterior mounted southern exposed PVC would be allowed if it fully fell in the shade of another building or other structure, man-made or not.

An example for the exception would be a free standing strut rack structure. The conduits on a free standing strut rack are also vulnerable but apparently less so than conduits mounted to the outside of a building face subject to southern exposure. The conduits (and conductors) are exposed to increased temperature from the radiated heat which is a greater temperature than that of a free standing strut rack located in the same geographical location.

It would be difficult to provide pictures with the allowed time frame for public input. I don't think pictures would be showing the code making panel anything they haven't already seen.

Submitter Information Verification

Submitter Full Name:	Norman Feck
Organization:	State of Colorado
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Sat May 16 14:20:49 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: It is expected for PVC conduit to discolor or char when exposed to extreme sunlight. This Public Input did not include evidence or technical substantiation that PVC conduit listed as sunlight resistant has degraded to an unacceptable performance level and is not suitable for southern exposure.

Public Input No. 1106-NFPA 70-2020 [New Section after 352.12(E)]

TITLE OF NEW CONTENT 352.12(G) Rooftops.

Type your content here ...

Rooftops.

Statement of Problem and Substantiation for Public Input

PVC conduit does have a stamp on it that reads 'Sunlight Resistant'. It may be resistant but cannot withstand direct and prolonged exposure without damaging the conduit.

Conduits installed in direct and prolonged exposure to the sun toast and bubble.They are damaged. The conduits also sag between supports even when supported at appropriate intervals.

Perhaps 110.3B could be cited, deeming PVC on rooftops a violation. Being sunlight resistant is not being sunlight proof.

Submitter Information Verification

Submitter Full Name:	Norman Feck
Organization:	State of Colorado
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Sat May 16 14:55:45 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: It is expected for PVC conduit to discolor or char when exposed to extreme sunlight. Proper installation with the appropriate expansion fittings shall be used to prevent the conduit from sagging between supports. This Public Input did not include evidence or technical substantiation that PVC conduit listed as sunlight resistant has degraded to an unacceptable performance level and is not suitable for rooftops.

Public Input No. 1104-NFPA 70-2020 [Section No. 352.12 [Excluding any Sub-Sections]]

PVC conduit shall not be used under the conditions specified in 352.12(A) through (~~E~~ G).

Statement of Problem and Substantiation for Public Input

A through E is changed to A through G to make room for new pubic input.

Submitter Information Verification

Submitter Full Name: Norman Feck

Organization: State of Colorado

Street Address:

City:

State:

Zip:

Submittal Date: Sat May 16 14:17:22 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: Renumbering will not be required. See resolved Public Inputs 1105 and 1106.

Public Input No. 1290-NFPA 70-2020 [Sections 352.24, 352.26]

Sections 352.24, 352.26

352.24 ~~Bends —~~ Bends

(A) How Made.

~~– Bends shall be so made that the conduit will not be damaged and the internal diameter of the conduit will not be effectively reduced. Field bends shall be made only with identified bending equipment. The radius of the curve to the centerline of such bends shall not be less than shown in Table 2, Chapter 9.~~

~~**352.26** Bends —~~ (B) Number in One Run. ~~– There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, for example, conduit bodies and boxes.~~

Statement of Problem and Substantiation for Public Input

Sections 352.24 and 352.26 have been combined into a single section for clarity and usability.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 28 11:25:12 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7569-NFPA 70-2020

Statement: This First Revision combines Sections 352.24 and 352.26 into a single section for clarity and usability and clarifies the number of degrees of bends permitted to be used in a conduit run between pull points.

Public Input No. 3273-NFPA 70-2020 [Section No. 352.26]

352.26 Bends — Number in One Run.

There shall not be more than ~~the equivalent of four quarter bends (~~ 360 degrees ~~total)~~ of bend between pull points, for example, conduit bodies and boxes.

Statement of Problem and Substantiation for Public Input

The language "four quarter bends" is unnecessary and can lead to misapplication of the rule. There are cases where the inspection authority uses that term to say that bends exceeding 90 degrees are not permitted. In other cases code users say that you only count the "quarter bends" and not the kicks and offsets in the run. Neither of those interpretations are the intent of the rule. This language removes those possible misapplications of the rule, but is not a technical change. The rule, after the change, still prohibits runs that have more than 360 degrees of bend between pull points.\ which is the actual intent of the rule.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3271-NFPA 70-2020 [Section No. 344.26]	same change different raceway
Public Input No. 3270-NFPA 70-2020 [Section No. 342.26]	same change different raceway
Public Input No. 3274-NFPA 70-2020 [Section No. 353.26]	same change different raceway
Public Input No. 3275-NFPA 70-2020 [Section No. 355.26]	same change different raceway
Public Input No. 3276-NFPA 70-2020 [Section No. 358.26]	same change different raceway
Public Input No. 3270-NFPA 70-2020 [Section No. 342.26]	
Public Input No. 3271-NFPA 70-2020 [Section No. 344.26]	
Public Input No. 3274-NFPA 70-2020 [Section No. 353.26]	
Public Input No. 3275-NFPA 70-2020 [Section No. 355.26]	
Public Input No. 3276-NFPA 70-2020 [Section No. 358.26]	

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 07 13:50:59 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7569-NFPA 70-2020

Statement: This First Revision combines Sections 352.24 and 352.26 into a single section for clarity and usability and clarifies the number of degrees of bends permitted to be used in a conduit run between pull points.

Public Input No. 3091-NFPA 70-2020 [Section No. 352.30(A)]

(A) Securely Fastened.

PVC conduit shall be securely fastened within 900 mm (3 ft) of each outlet box, junction box, device box, conduit body, ~~or other conduit~~ and within 300 mm (12 in.) of every service head, cable end, conductor end or conduit termination. Conduit listed for securing at other than 900 mm (3 ft) shall be permitted to be installed in accordance with the listing.

Statement of Problem and Substantiation for Public Input

The end of these open raceways with the conductors and cables emerging from the raceway need to be addtional support and to be secured closer to the end of the raceway in these application.

Submitter Information Verification

Submitter Full Name: Mark Rochon

Organization: [Not Specified]

Street Address:

City:

State:

Zip:

Submittal Date: Fri Sep 04 14:38:34 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: This Public Input did not include evidence or technical/structural integrity associated with the moment created by the weight of the conduit and cables on the open end from the last support within the substantiation. This Public Input also introduced terms that are not defined. See Article 230 for clearances and supporting requirements for raceways used for service entrance conductors.

Public Input No. 1107-NFPA 70-2020 [Section No. 352.44]

352.44 Expansion Fittings.

Expansion fittings for PVC conduit shall be provided to compensate for thermal expansion and contraction where the length change, in accordance with Table 352.44, is expected to be 6 mm (¼ in.) or greater in a straight run between securely mounted items such as boxes, cabinets, elbows, or other conduit terminations.

Expansion fittings for PVC shall also be provided where underground runs of conduit emerge from the ground to compensate for earth settling and heaving characteristics. Securely fasten the above ground portion in accordance with 352.30 placing the fastener on the stationary portion of the expansion fitting or raceway.

Exception: Where the authority having jurisdiction deems a PVC conduit installation is not susceptible to movement that could cause damage, the expansion fitting shall not be required, such as short runs of underground conduit.

Table 352.44 Expansion Characteristics of PVC Rigid Nonmetallic Conduit Coefficient of Thermal Expansion = 6.084×10^{-5} mm/mm/°C (3.38×10^{-5} in./in./°F)

Temperature Change (°C)	Length Change of PVC Conduit (mm/m)	-	Temperature Change (°F)	Length Change of PVC Conduit (in./100 ft)	Temperature Change (°F)	Length Change of PVC Conduit (in./100 ft)
5	0.30	-	5	0.20	105	4.26
10	0.61	-	10	0.41	110	4.46
15	0.91	-	15	0.61	115	4.66
20	1.22	-	20	0.81	120	4.87
25	1.52	-	25	1.01	125	5.07
30	1.83	-	30	1.22	130	5.27
35	2.13	-	35	1.42	135	5.48
40	2.43	-	40	1.62	140	5.68
45	2.74	-	45	1.83	145	5.88
50	3.04	-	50	2.03	150	6.08
55	3.35	-	55	2.23	155	6.29
60	3.65	-	60	2.43	160	6.49
65	3.95	-	65	2.64	165	6.69
70	4.26	-	70	2.84	170	6.90
75	4.56	-	75	3.04	175	7.10
80	4.87	-	80	3.24	180	7.30
85	5.17	-	85	3.45	185	7.50
90	5.48	-	90	3.65	190	7.71
95	5.78	-	95	3.85	195	7.91
100	6.08	-	100	4.06	200	8.11

Statement of Problem and Substantiation for Public Input

In time and in relatively short times, PVC is pulled from the bottom of an enclosure or heaved into it due to earth movement or prior excavation work. PVC conduits are fragile compared to other non-flexible raceways and need this extra precaution. Soil conditions vary across the country; bentonite and such.

300.5(J) could have the new language added that directly requires the expansion fitting instead of adding to 352.44 as suggested with this public input, making it apply to other raceways. It is the more fragile raceways that are more concerning. 300.5(J) looks to refer to the underground portion of the electrical work.

110.3(A)(2) could also be cited for the problem but a code reference more specific to the on-going problem is preferred. 300.7(B) requires expansion fittings for thermal reasons only (correct considering the 300.7 title). 300.4(H) requires expansion fittings where raceways cross structural joints only (correct again).

Included is an exception to the expansion fitting requirement. Maybe the PVC sleeves direct bury cable. Maybe the PVC is a very short run. Maybe the PVC is deemed not susceptible to motion.

I realize thermal expansion of PVC conduits does factor in here but the conduits discussed are generally short runs (the above ground portion of those runs) emerging from the ground that are subject to earth movement which at times may play a bigger role in busting up these conduits and/or the enclosures to which they attach.

Submitter Information Verification

Submitter Full Name: Norman Feck

Organization: State of Colorado

Street Address:

City:

State:

Zip:

Submittal Date: Sat May 16 15:03:40 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7571-NFPA 70-2020

Statement: 352.44 was revised to address earth movement, including frost heave, and the installation of expansion fittings and correlated to 300.5(D)(1).

Public Input No. 1324-NFPA 70-2020 [Section No. 352.60]

352.60 Equipment Grounding Conductor .

Where equipment ~~grounding~~ is required to be connected to the circuit equipment grounding conductor , a separate equipment grounding conductor of the wire type shall be installed in the conduit in accordance with 250 .118.

Exception No. 1: As permitted in 250.134, Exception No. 2, for dc circuits and 250.134, Exception No. 1, for separately run equipment grounding conductors.

Exception No. 2: ~~Where~~ The equipment grounding conductor shall not be required where the grounded conductor is used to ground equipment as permitted in 250.142.

Statement of Problem and Substantiation for Public Input

No. 1. According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about 'Grounding.'
No. 2 Text revised to make it clear that we the conversation is about the connection to the equipment grounding conductor, not 'ground.'
No. 3 Revised the exception to match the exact text contained in 353.60 Exception No. 2.

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jun 01 14:09:09 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: 250.118 was not referenced since it does not have installation requirements for wire type equipment grounding conductors in PVC conduit CMP-8 maintains its position from the previous cycle to the title. The submitter’s Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. Section 352.60 is intended to assure that where grounding was needed, that it was unacceptable to use non-metallic raceway as a bonding method. However, this section is intended to address all grounding needs whether that be for service as an Equipment Grounding Conductor, or other grounding needs such as equipotential bonding, static grounding, and in some cases lightning protection requirements associated with NFPA 780. Though it does apply to EGC’s, to dedicate this section solely to EGC’s changes its designed purpose to address all grounding and bonding needs and diminishes its full intent

Public Input No. 1223-NFPA 70-2020 [New Section after 352.100]

352.?? Standard Length.

The standard length of PVC shall be 3.05 m (10 ft), including an integrated coupling. Longer or shorter non-standard lengths with or without an integrated coupling shall be permitted.

Statement of Problem and Substantiation for Public Input

This change will formalize what is already standard industry practice. The NEC has improved significantly in large part due to improved formatting, use of language and consistency of requirements and application. This change will continue the trend of making the NEC consistent and predictable while allowing manufacturers and installers creativity and flexibility.

Submitter Information Verification

Submitter Full Name: Gary Hein

Organization: Submission is independent of employer.

Street Address:

City:

State:

Zip:

Submittal Date: Sat May 23 10:44:42 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: The NEC is not a design manual nor product standard, standard length information is not necessary.

Public Input No. 3859-NFPA 70-2020 [Section No. 353.1]

353.1 Scope.

This article covers the use, installation, and construction specifications for high density polyethylene (HDPE) conduit and associated fittings.

Informational Note: ~~Refer to Article~~ ~~352~~ See 352.1 for Rigid Polyvinyl Chloride Conduit: Type PVC and ~~Article~~ 355.1 for Reinforced Thermosetting Resin Conduit: Type RTRC.

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the 2020 NEC(r) Style Manual prohibits reference to an entire article, other than Article 100. As such, it is proposed to revise these references to the scope of the respective articles and the informational note is reorganized in accordance with Section 4.1.3 of the NEC(r) Style Manual.

Submitter Information Verification

Submitter Full Name: Richard Holub

Organization: The DuPont Company, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Wed Sep 09 14:07:41 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7517-NFPA 70-2020

Statement: The Informational Note was deleted since the reference to Article 353 was in general and not to a specific section. A reference to an Article in general is a violation of Section 4.1.4 of the 2020 NEC Style Manual.

Public Input No. 2911-NFPA 70-2020 [Section No. 353.2]

~~**353.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

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

~~A nonmetallic raceway of circular cross section, with associated couplings, connectors, and fittings for the installation of electrical conductors.~~

Statement of Problem and Substantiation for Public Input

The definition for HDPE Conduit was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2889-NFPA 70-2020 [New Definition after Definition: Conductor, Insulated.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:15:44 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3548-NFPA 70-2020 [Section No. 353.2]

(Relocate all definitions in the 353. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

353. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

High Density Polyethylene (HDPE) Conduit.

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

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams

Organization: Delta Charter Township

Street Address:

City:

State:

Zip:

Submittal Date: Tue Sep 08 22:01:05 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 1000-NFPA 70-2020 [Sections 353.10, 353.12]

Sections 353.10, 353.12

353.10 Uses Permitted.

The use of HDPE conduit shall be permitted under the following conditions:

(1) In discrete lengths or in continuous lengths from a reel

(2) In locations subject to severe corrosive influences as covered in 300.6 and where subject to chemicals for which the conduit is listed

(3) In cinder fill

(4) In direct burial installations in earth or concrete

Informational Note to (4): Refer to 300.5 and 300.50 for underground installations.

(5) ~~Above ground~~ Exposed , except as prohibited in 353.12, ~~where encased~~ when encased in not less than 50 mm (2 in.) of concrete.

(6) Within a building, except as prohibited in 353.12 , when encased in not less than 50 mm (2 in.) of concrete.

(7) Conductors or cables rated at a temperature higher than the listed temperature rating of HDPE conduit shall be permitted to be installed in HDPE conduit, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the HDPE conduit.

353.12 Uses Not Permitted.

HDPE conduit shall not be used under the following conditions:

(1) ~~Where exposed~~ Where exposed and not encased in not less than 50 mm (2 in.) of concrete

(2) Within a building and not encased in not less than 50 mm (2 in.) of concrete

(3) In any hazardous (classified) location, except as permitted by other articles in this *Code*

(4) Where subject to ambient temperatures in excess of 50°C (122°F) unless listed otherwise

Statement of Problem and Substantiation for Public Input

The installation of HDPE in the concrete slab structures of a building has been questioned by Electrical Engineers and some AHJs in the past. This would help clarify that encasing HDPE in not less than 50 mm (2 in.) of concrete within a building would be permissable per NFPA 70 NEC Article 353.

Submitter Information Verification

Submitter Full Name: Bill Edler

Organization: Inglett & Stubbs, LLC.

Street Address:

City:

State:

Zip:

Submittal Date: Fri May 08 06:06:00 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: HDPE conduit is not permissible within a building. Due to the inherent properties of the HDPE to propagate fire, a technical report needs to be provided to support the use of a combustible material encased in floors, ceilings, and walls.

Public Input No. 1275-NFPA 70-2020 [Sections 353.24, 353.26]

Sections 353.24, 353.26

353.24 ~~Bends —~~ Bends

(A) How Made.

~~Bends shall be so made that the conduit will not be damaged and the internal diameter of the conduit will not be effectively reduced. Bends shall be permitted to be made manually without auxiliary equipment, and the radius of the curve to the centerline of such bends shall not be less than shown in Table 354.24 . For conduits of metric designators 129 and 155 (trade sizes 5 and 6) the allowable radii of bends shall be in accordance with specifications provided by the manufacturer.~~

~~**353.26** Bends —~~ (B) Number in One Run. ~~There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, for example, conduit bodies and boxes.~~

Statement of Problem and Substantiation for Public Input

Sections 353.24 and 353.26 have been combined into a single section for clarity and usability.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 28 10:23:55 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7520-NFPA 70-2020

Statement: This First Revision combines Sections 353.24 and 353.26 into a single Section for clarity and usability and clarifies the number of degrees of bends permitted to be used in a conduit run between pull points.

Public Input No. 3274-NFPA 70-2020 [Section No. 353.26]

353.26 Bends — Number in One Run.

There shall not be more than ~~the equivalent of four quarter bends (~~ 360 degrees ~~total)~~ of bend between pull points, for example, conduit bodies and boxes.

Statement of Problem and Substantiation for Public Input

The language "four quarter bends" is unnecessary and can lead to misapplication of the rule. There are cases where the inspection authority uses that term to say that bends exceeding 90 degrees are not permitted. In other cases code users say that you only count the "quarter bends" and not the kicks and offsets in the run. Neither of those interpretations are the intent of the rule. This language removes those possible misapplications of the rule, but is not a technical change. The rule, after the change, still prohibits runs that have more than 360 degrees of bend between pull points.\ which is the actual intent of the rule.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3273-NFPA 70-2020 [Section No. 352.26]	same change different raceway
Public Input No. 3271-NFPA 70-2020 [Section No. 344.26]	same change different raceway
Public Input No. 3270-NFPA 70-2020 [Section No. 342.26]	same change different raceway
Public Input No. 3275-NFPA 70-2020 [Section No. 355.26]	same change different raceway
Public Input No. 3276-NFPA 70-2020 [Section No. 358.26]	same change different raceway
Public Input No. 3270-NFPA 70-2020 [Section No. 342.26]	
Public Input No. 3271-NFPA 70-2020 [Section No. 344.26]	
Public Input No. 3273-NFPA 70-2020 [Section No. 352.26]	
Public Input No. 3275-NFPA 70-2020 [Section No. 355.26]	
Public Input No. 3276-NFPA 70-2020 [Section No. 358.26]	

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 07 13:52:50 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7520-NFPA 70-2020

Statement: This First Revision combines Sections 353.24 and 353.26 into a single Section for clarity and usability and clarifies the number of degrees of bends permitted to be used in a conduit run between pull points.

Public Input No. 1276-NFPA 70-2020 [Section No. 353.48]

353.48 Joints.

All joints between lengths of conduit, ~~and between conduit and couplings, fittings,~~ fittings, and boxes, shall be made by an approved method.

~~Informational Note:~~

HDPE conduit

~~can~~

shall be joined together using either

~~heat fusion,~~

electrofusion

~~,~~

or mechanical fittings.

Statement of Problem and Substantiation for Public Input

Revise 353.48 to specify the permissible joining methods. Heat or butt fusion has been removed from the informational note because these joining methods result in an internal lip or bead formed on the conduit ID, which may 'burn' or damage the cabling when it is subsequently pulled into the raceway and over the lip. Futhermore, the lip will reduce the potential wire pull surface area and wirefill calculations.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 28 10:28:43 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7537-NFPA 70-2020

Statement: Revise 353.48 to specify the permissible joining methods. Heat or butt fusion has been removed from the informational note because these joining methods result in an internal lip or bead formed on the conduit ID, which may 'burn' or damage the cabling when it is subsequently pulled into the raceway and over the lip. Furthermore, the lip will reduce the potential wire pull surface area and conduit fill calculations.

Public Input No. 1325-NFPA 70-2020 [Section No. 353.60]

353.60 Equipment Grounding Conductor .

Where equipment ~~grounding~~ is required to be connected to the circuit equipment grounding conductor , a separate equipment grounding conductor of the wire type shall be installed in the ~~conduit.~~ raceway in accordance with 250.118.

Exception No. 1: The equipment grounding conductor shall be permitted to be run separately from the conduit where used for grounding dc circuits as permitted in 250.134, Exception No. 2.

Exception No. 2: The equipment grounding conductor shall not be required where the grounded conductor is used to ground equipment as permitted in 250.142.

Statement of Problem and Substantiation for Public Input

No. 1. According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about 'Grounding.'
No. 2 Text revised to make it clear that we the conversation is about the connection to the equipment grounding conductor, not 'ground.'

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 01 14:18:07 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter's Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The grounding is not exclusive to Equipment Grounding Conductor. The Section is in place to address any grounding or bonding requirements. Section 250.118 does not have installation requirements for the equipment grounding conductors. Section 353.60 is intended to assure that where grounding was needed, that it was unacceptable to use non-metallic raceway as a bonding method. However, this section is intended to address all grounding needs whether that be for service as an Equipment Grounding Conductor, or other grounding needs such as equipotential bonding, static grounding, and in some cases lightning protection requirements associated with NFPA 780. Though it does apply to EGC's, to dedicate this section solely to EGC's changes its designed purpose to address all grounding and bonding needs and diminishes its full intent.

Public Input No. 2912-NFPA 70-2020 [Section No. 354.2]

~~**354.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

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

~~A factory assembly of conductors or cables inside a nonmetallic, smooth wall raceway with a circular cross section.~~

Statement of Problem and Substantiation for Public Input

The definition for NUCC was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2889-NFPA 70-2020 [New Definition after Definition: Conductor, Insulated.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:17:26 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3549-NFPA 70-2020 [Section No. 354.2]

(Relocate all definitions in the 354. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

354. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

Nonmetallic Underground Conduit with Conductors (NUCC).

A factory assembly of conductors or cables inside a nonmetallic, smooth wall raceway with a circular cross section.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams

Organization: Delta Charter Township

Street Address:

City:

State:

Zip:

Submittal Date: Tue Sep 08 22:02:42 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 4544-NFPA 70-2020 [Section No. 354.10]

354.10 Uses Permitted.

The use of NUCC and fittings shall be permitted in the following:

(1) For direct burial underground installation (For minimum cover requirements, see Table 300.5 under nonmetallic raceways and Table 300.50 under ~~Rigid Nonmetallic Conduit~~ rtrc,pvc and hdpe raceways .)

(2) Encased or embedded in concrete

(3) In cinder fill

(4) In underground locations subject to severe corrosive influences as covered in 300.6 and where subject to chemicals for which the assembly is specifically approved

(5) Aboveground, except as prohibited in 354.12, where encased in not less than 50 mm (2 in.) of concrete

Statement of Problem and Substantiation for Public Input

Rigid nonmetallic conduit is no longer used at the reference tables. Table 300.5 now use the term nonmetallic raceways and table 300.50 provides a list of the non-metallic raceways. Rtrc,pvc and hdpe.

Submitter Information Verification

Submitter Full Name: David Humphrey
Organization: County of Henrico, Virginia
Street Address:
City:
State:
Zip:

Submittal Date: Thu Sep 10 14:54:15 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7539-NFPA 70-2020

Statement: Rigid nonmetallic conduit is no longer used in the reference tables.Table 300.5 now uses the term nonmetallic raceways and table 300.50 provides a list of the non-metallic raceway, RTRC, PVC and HDPE.

Public Input No. 1224-NFPA 70-2020 [New Section after 354.20]

355.?? Standard Lengths.

The standard length of RTRC shall be 3.05 m (10 ft) or 6.10m (20 ft), with or without integral fittings. Longer or shorter non-standard lengths with or without integral fittings shall be permitted.

Statement of Problem and Substantiation for Public Input

This change will formalize what is already standard industry practice. The NEC has improved significantly in large part due to improved formatting, use of language and consistency of requirements and application. This change will continue the trend of making the NEC consistent and predictable while allowing manufacturers and installers creativity and flexibility.

Submitter Information Verification

Submitter Full Name:	Gary Hein
Organization:	Submission is independent of employer.
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Sat May 23 10:51:56 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: The NEC is not a design manual nor product standard, standard length information is not necessary.

Public Input No. 1277-NFPA 70-2020 [Sections 354.24, 354.26]

Sections 354.24, 354.26

354.24 ~~Bends —~~ Bends

(A) How Made.

~~Bends shall be manually made so that the conduit will not be damaged and the internal diameter of the conduit will not be effectively reduced. The radius of the curve of the centerline of such bends shall not be less than shown in Table 354.24 .~~

~~Table 354.24 Minimum Bending Radius for Nonmetallic Underground Conduit with Conductors (NUCC)~~

~~Conduit Size~~		-	~~Minimum Bending Radius~~	
~~Metric Designator~~	~~Trade Size~~	-	~~mm~~	~~in.~~
~~16~~	~~1/2~~	-	~~250~~	~~10~~
~~21~~	~~3/4~~	-	~~300~~	~~12~~
~~27~~	~~1~~	-	~~350~~	~~14~~
~~35~~	~~1 1/4~~	-	~~450~~	~~18~~
~~41~~	~~1 1/2~~	-	~~500~~	~~20~~
~~53~~	~~2~~	-	~~650~~	~~26~~
~~63~~	~~2 1/2~~	-	~~900~~	~~36~~
~~78~~	~~3~~	-	~~1200~~	~~48~~
~~103~~	~~4~~	-	~~1500~~	~~60~~

~~**354.26** Bends —~~

(B) Number in One Run.

~~There shall not be more than the equivalent of four quarter bends (360 degrees total) between termination points.~~

Statement of Problem and Substantiation for Public Input

Sections 354.24 and 354.26 have been combined into a single section for clarity and usability.

Submitter Information Verification

Submitter Full Name: Megan Hayes

Organization: Nema

Street Address:

City:

State:

Zip:

Submittal Date: Thu May 28 10:33:41 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7540-NFPA 70-2020

Statement: This First Revision combines Sections 354.24 and 354.26 into a single Section for clarity and usability and clarifies the number of degrees of bends permitted to be used in a conduit run between pull points.

Public Input No. 1334-NFPA 70-2020 [Section No. 354.60]

354.60 ~~Grounding~~ Equipment Grounding Conductor .

Where equipment ~~grounding~~ is required to be connected to the circuit equipment grounding conductor , an assembly containing a separate equipment grounding conductor of the wire type shall be used.

Exception: The equipment grounding conductor shall not be required where the grounded conductor is used to ground equipment as permitted in 250.142.

Statement of Problem and Substantiation for Public Input

No. 1. According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about 'Grounding.'
No. 2 Text revised to make it clear that we the conversation is about the connection to the equipment grounding conductor, not 'ground.'
No. 3 Added an exception so that it matches all other nonmetallic raceways.

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jun 01 16:23:21 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter's Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The grounding is not exclusive to Equipment Grounding Conductor. The Section is in place to address any grounding or bonding requirements. Section 250.118 does not have installation requirements for the equipment grounding conductors. Section 354.60 is intended to assure that where grounding was needed, that it was unacceptable to use non-metallic raceway as a bonding method. However, this section is intended to address all grounding needs whether that be for service as an Equipment Grounding Conductor, or other grounding needs such as equipotential bonding, static grounding, and in some cases lightning protection requirements associated with NFPA 780. Though it does apply to EGC's, to dedicate this section solely to EGC's changes its designed purpose to address all grounding and bonding needs and diminishes its full intent.

Public Input No. 3860-NFPA 70-2020 [Section No. 355.1]

355.1 Scope.

This article covers the use, installation, and construction specification for reinforced thermosetting resin conduit (RTRC) and associated fittings.

Informational Note: ~~Refer to Article~~ 352 See 352 .1 for Rigid Polyvinyl Chloride Conduit: Type PVC, and ~~Article~~ 353.1 for High Density Polyethylene Conduit: Type HDPE.

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the 2020 NEC(r) Style Manual prohibits reference to an entire article, other than Article 100. As such, it is proposed to revise these references to the scope of the respective articles and the informational note is reorganized in accordance with Section 4.1.3 of the NEC(r) Style Manual.

Submitter Information Verification

Submitter Full Name: Richard Holub
Organization: The DuPont Company, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 14:09:13 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7542-NFPA 70-2020

Statement: This First Revision deletes the Informational Note in 355.1 since it is no longer needed. The Informational Note was useful when the nonmetallic conduits separated into individual Articles several cycles ago. The new Articles for different nonmetallic conduits are now well established. By deleting the Informational Note, 355.1 is now compliant with the 2020 NEC Style Manual, Section 4.1.4.

Note to the Correlating Committee; A revision was made to the Scope of RTRC Conduit.

Public Input No. 2914-NFPA 70-2020 [Section No. 355.2]

~~**355.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

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

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

Statement of Problem and Substantiation for Public Input

The definition for RTRC was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2889-NFPA 70-2020 [New Definition after Definition: Conductor, Insulated.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:19:01 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3551-NFPA 70-2020 [Section No. 355.2]

(Relocate all definitions in the 355. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

355. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

Reinforced Thermosetting Resin Conduit (RTRC).

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

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 22:07:40 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 1225-NFPA 70-2020 [New Section after 355.20]

358.?? Standard Length.

The standard length of EMT shall be 3.05 m (10 ft).

Statement of Problem and Substantiation for Public Input

This change will formalize what is already standard industry practice. The NEC has improved significantly in large part due to improved formatting, use of language and consistency of requirements and application. This change will continue the trend of making the NEC consistent and predictable. .

Submitter Information Verification

Submitter Full Name:	Gary Hein
Organization:	Submission is independent of employer.
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Sat May 23 10:56:35 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: The NEC is not a design manual nor product standard, standard length information is not necessary.

Public Input No. 1278-NFPA 70-2020 [Sections 355.24, 355.26]

Sections 355.24, 355.26

355.24 ~~Bends —~~ Bends

(A) How Made.

~~Bends shall be so made that the conduit will not be damaged and the internal diameter of the conduit will not be effectively reduced. Field bends shall be made only with identified bending equipment. The radius of the curve to the centerline of such bends shall not be less than shown in Table 2, Chapter 9.~~

~~**355.26** Bends —~~ (B) Number in One Run. ~~There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, for example, conduit bodies and boxes.~~

Statement of Problem and Substantiation for Public Input

Section 355.24 and 355.26 have been combined into a single section for clarity and usabililty.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 28 10:37:30 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7545-NFPA 70-2020

Statement: This First Revision combines Sections 355.24 and 355.26 into a single Section for clarity and usability and clarifies the number of degrees of bends permitted to be used in a conduit run between pull points.

Public Input No. 3275-NFPA 70-2020 [Section No. 355.26]

355.26 Bends — Number in One Run.

There shall not be more than ~~the equivalent of four quarter bends (~~ 360 degrees ~~total)~~ of bend between pull points, for example, conduit bodies and boxes.

Statement of Problem and Substantiation for Public Input

The language "four quarter bends" is unnecessary and can lead to misapplication of the rule. There are cases where the inspection authority uses that term to say that bends exceeding 90 degrees are not permitted. In other cases code users say that you only count the "quarter bends" and not the kicks and offsets in the run. Neither of those interpretations are the intent of the rule. This language removes those possible misapplications of the rule, but is not a technical change. The rule, after the change, still prohibits runs that have more than 360 degrees of bend between pull points.\ which is the actual intent of the rule.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3270-NFPA 70-2020 [Section No. 342.26]	same change different raceway
Public Input No. 3271-NFPA 70-2020 [Section No. 344.26]	same change different raceway
Public Input No. 3273-NFPA 70-2020 [Section No. 352.26]	same change different raceway
Public Input No. 3274-NFPA 70-2020 [Section No. 353.26]	same change different raceway
Public Input No. 3276-NFPA 70-2020 [Section No. 358.26]	same change different raceway
Public Input No. 3270-NFPA 70-2020 [Section No. 342.26]	
Public Input No. 3271-NFPA 70-2020 [Section No. 344.26]	
Public Input No. 3273-NFPA 70-2020 [Section No. 352.26]	
Public Input No. 3274-NFPA 70-2020 [Section No. 353.26]	
Public Input No. 3276-NFPA 70-2020 [Section No. 358.26]	

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 07 13:57:50 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7545-NFPA 70-2020

Statement: This First Revision combines Sections 355.24 and 355.26 into a single Section for clarity and usability and clarifies the number of degrees of bends permitted to be used in a conduit run between pull points.

Public Input No. 1336-NFPA 70-2020 [Section No. 355.60]

355.60 Equipment Grounding Conductor .

Where equipment ~~grounding~~ is required to be connected to the circuit equipment grounding conductor , a separate equipment grounding conductor of the wire type shall be installed in the conduit in accordance with 250 .122.

Exception No. 1: As permitted in 250.134, Exception No. 2, for dc circuits and 250.134, Exception No. 1, for separately run equipment grounding conductors.

Exception No. 2: ~~Where~~ The equipment grounding conductor shall not be required where the grounded conductor is used to ground equipment as permitted in 250.142 .

Statement of Problem and Substantiation for Public Input

No. 1. According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about 'Grounding.'
No. 2 Text revised to make it clear that we the conversation is about the connection to the equipment grounding conductor, not 'ground.'
No. 3 Revised Exception No. 2 so that it matches 535.60 Exception No. 2.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 01 16:28:31 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter's Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The grounding is not exclusive to Equipment Grounding Conductor. The Section is in place to address any grounding or bonding requirements. Section 250.118 does not have installation requirements for the equipment grounding conductors. Section 355.60 is intended to assure that where grounding was needed, that it was unacceptable to use non-metallic raceway as a bonding method. However, this section is intended to address all grounding needs whether that be for service as an Equipment Grounding Conductor, or other grounding needs such as equipotential bonding, static grounding, and in some cases lightning protection requirements associated with NFPA 780. Though it does apply to EGC's, to dedicate this section solely to EGC's changes its designed purpose to address all grounding and bonding needs and diminishes its full intent.

Public Input No. 2915-NFPA 70-2020 [Section No. 356.2]

~~**356.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

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

~~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 Type LFNC-A~~

(2) ~~A smooth inner surface with integral reinforcement within the raceway wall, designated as Type LFNC-B~~

(3) ~~A corrugated internal and external surface without integral reinforcement within the raceway wall, designated as Type LFNC-C~~

~~Informational Note: FNMC is an alternative designation for LFNC.~~

Statement of Problem and Substantiation for Public Input

The definition for LFNC was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2889-NFPA 70-2020 [New Definition after Definition: Conductor, Insulated.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:20:40 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a

single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3552-NFPA 70-2020 [Section No. 356.2]

(Relocate all definitions in the 356. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

356. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

Liquidtight Flexible Nonmetallic Conduit (LFNC).

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 Type LFNC-A

(2) A smooth inner surface with integral reinforcement within the raceway wall, designated as Type LFNC-B

(3) A corrugated internal and external surface without integral reinforcement within the raceway wall, designated as Type LFNC-C

Informational Note: FNMC is an alternative designation for LFNC.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams

Organization: Delta Charter Township

Street Address:

City:

State:

Zip:

Submittal Date: Tue Sep 08 22:09:17 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 1052-NFPA 70-2020 [Section No. 356.10]

356.10 Uses Permitted.

LFNC shall be permitted to be used in exposed or concealed locations for the following purposes:

(1) Where flexibility is required for installation, operation, or maintenance.

(2) Where protection of the contained conductors is required from vapors, machine oils, liquids, or solids.

(3) For outdoor locations where listed and marked as suitable for the purpose.

(4) For direct burial where listed and marked for the purpose.

(5) Type LFNC shall be permitted to be installed in lengths longer than 1.8 m (6 ft) where secured in accordance with 356.30.

(6) Type LFNC-B as a listed manufactured prewired assembly, metric designator 16 through 27 (trade size ½ through 1) conduit shall be permitted .

(7) For encasement in concrete where listed for direct burial and installed in compliance with 356.42.

(8) Conductors or cables rated at a temperature higher than the listed temperature rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC.

Informational Note: Extreme cold can cause some types of nonmetallic conduits to become brittle and therefore more susceptible to damage from physical contact.

Statement of Problem and Substantiation for Public Input

The phrase shall be permitted was added to list item (6) to make it clear that Type LFNC-B is not restricted to be used only as a prewired assembly. Listed Type LFNC is a conduit per UL 1650 where conductors are installed after the conduit system is installed. It also may be used as a manufactured wiring method per UL 183 along with other wiring methods such as but not limited to Type MC Cable. The revisions to list item (8) were to match the TIA that allows higher rated conductors to be use as long as the ampacity does not exceed the temperature marking on the LFNC.

Submitter Information Verification

Submitter Full Name:	Christine Porter
Organization:	Intertek Testing Services
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Wed May 13 16:38:18 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7502-NFPA 70-2020

Statement: The phrase "shall be permitted" does not add clarity. For consistency the phrase "shall be permitted to be" in 356.10(5) has been eliminated. The charging section already denotes "shall be permitted".

CMP-8 reaffirms the action on Tentative Interim Amendment No. 20-10 that adds the previously omitted text.

The addition of permission for use in corrosive environments is already approved use in Section 680.21(2), 680.23(B)(2), 680.23(F)(1), 680.25(A), 680.27(A)(2), and 680.42(A)(1).

The added language is consistent with sections 352.10(B), 353.10(2), 355.10(B) and 362.10(3).

Public Input No. 1968-NFPA 70-2020 [Section No. 356.10]

356.10 Uses Permitted.

LFNC shall be permitted to be used in exposed or concealed locations for the following purposes:

(1) Where flexibility is required for installation, operation, or maintenance.

(2) Where protection of the contained conductors is required from vapors, machine oils, liquids, or solids.

(3) For outdoor locations where listed and marked as suitable for the purpose.

(4) For direct burial where listed and marked for the purpose.

(5) Type LFNC shall be permitted to be installed in lengths longer than 1.8 m (6 ft) where secured in accordance with 356.30.

(6) Type LFNC-B as a listed manufactured prewired assembly, metric designator 16 through 27 (trade size ½ through 1) conduit.

(7) For encasement in concrete where listed for direct burial and installed in compliance with 356.42.

(8) Conductors or cables rated at a temperature <u>equal to or higher than the listed temperature</u> rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC.

Informational Note: Extreme cold can cause some types of nonmetallic conduits to become brittle and therefore more susceptible to damage from physical contact.

Statement of Problem and Substantiation for Public Input

The phrase “higher than the listed temperature” was inadvertently omitted during the 2020 revision process as the information was transferred from the WORD document to Terra and on to the written ballot. The proposed revision corrects the text to that which was approved by the panel at the First Draft meeting.
The substantiation for the 2020 PI (1126) (FR 7894) is repeated here for information:
The temperature that LFNC is permitted to be used should be based on the temperature limitation of the contained conductors provided that the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC. The effect of the ambient temperature is addressed by the appropriate ampacity correction of the conductors or cables contained within the raceway.
This proposal will correctly treat the permitted temperature of LFNC the same as ENT in 362.10(() and PVC Conduit in 352.10(1) and relocates the temperature limitation on LFNC from 356.12 for uses not permitted to 356.10 for uses permitted consistent with other nonmetallic raceway articles.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:

Zip:

Submittal Date: Wed Jul 22 14:18:36 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7502-NFPA 70-2020

Statement: The phrase "shall be permitted" does not add clarity. For consistency the phrase "shall be permitted to be" in 356.10(5) has been eliminated. The charging section already denotes "shall be permitted".

CMP-8 reaffirms the action on Tentative Interim Amendment No. 20-10 that adds the previously omitted text.

The addition of permission for use in corrosive environments is already approved use in Section 680.21(2), 680.23(B)(2), 680.23(F)(1), 680.25(A), 680.27(A)(2), and 680.42(A)(1).

The added language is consistent with sections 352.10(B), 353.10(2), 355.10(B) and 362.10(3).

Public Input No. 2332-NFPA 70-2020 [Section No. 356.10]

356.10 Uses Permitted.

LFNC shall be permitted to be used in exposed or concealed locations for the following purposes:

(1) Where flexibility is required for installation, operation, or maintenance.

(2) Where protection of the contained conductors is required from vapors, machine oils, liquids, or solids.

(3) For outdoor locations where listed and marked as suitable for the purpose.

(4) For direct burial where listed and marked for the purpose.

(5) Type LFNC shall be permitted to be installed in lengths longer than 1.8 m (6 ft) where secured in accordance with 356.30.

(6) Type LFNC-B as a listed manufactured prewired assembly, metric designator 16 through 27 (trade size ½ through 1) conduit.

(7) For encasement in concrete where listed for direct burial and installed in compliance with 356.42.

(8) Conductors or cables rated at a temperature higher than the listed temperature rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC.

Informational Note: Extreme cold can cause some types of nonmetallic conduits to become brittle and therefore more susceptible to damage from physical contact.

Statement of Problem and Substantiation for Public Input

The revision accepted by the panel in PI 1126 (submitted by NEMA) was incorrectly recorded in FR 7894. The highlighted text from the PI was not included in the FR.
PI 1126 text
(8) Conductors or cables rated at a temperature higher than the listed temperature rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC.
FR 7894 text
(8) Conductors or cables rated at a temperature rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC.

Submitter Information Verification

Submitter Full Name: Brian Deacy
Organization: Atkore International
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 14 15:30:51 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7502-NFPA 70-2020

Statement: The phrase "shall be permitted" does not add clarity. For consistency the phrase "shall be permitted to be" in 356.10(5) has been eliminated. The charging section already denotes "shall be permitted".

CMP-8 reaffirms the action on Tentative Interim Amendment No. 20-10 that adds the previously omitted text.

The addition of permission for use in corrosive environments is already approved use in Section 680.21(2), 680.23(B)(2), 680.23(F)(1), 680.25(A), 680.27(A)(2), and 680.42(A)(1).

The added language is consistent with sections 352.10(B), 353.10(2), 355.10(B) and 362.10(3).

Public Input No. 2930-NFPA 70-2020 [Section No. 356.10]

356.10 Uses Permitted.

LFNC shall be permitted to be used in exposed or concealed locations for the following purposes:

(1) Where flexibility is required for installation, operation, or maintenance.

(2) Where protection of the contained conductors is required from vapors, machine oils, liquids, or solids.

(3) For outdoor locations where listed and marked as suitable for the purpose.

(4) For direct burial where listed and marked for the purpose.

(5) Type LFNC shall be permitted to be installed in lengths longer than 1.8 m (6 ft) where secured in accordance with 356.30.

(6) Type LFNC-B as a listed manufactured prewired assembly, metric designator 16 through 27 (trade size ½ through 1) conduit.

(7) For encasement in concrete where listed for direct burial and installed in compliance with 356.42.

(8) <u>In locations subject to corrosive.</u>

(9) Conductors or cables rated at a temperature rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC.

Informational Note: Extreme cold can cause some types of nonmetallic conduits to become brittle and therefore more susceptible to damage from physical contact.

Statement of Problem and Substantiation for Public Input

Adding (8) location subject to corrosion is to allow this wiring method to be used for swimming pools, not that Article 680 added rules related to wiring methods in corrosive locations.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 10:16:36 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7502-NFPA 70-2020

Statement: The phrase "shall be permitted" does not add clarity. For consistency the phrase "shall be permitted to be" in 356.10(5) has been eliminated. The charging section already denotes "shall be permitted".

CMP-8 reaffirms the action on Tentative Interim Amendment No. 20-10 that adds the previously omitted text.

The addition of permission for use in corrosive environments is already approved use in Section 680.21(2), 680.23(B)(2), 680.23(F)(1), 680.25(A), 680.27(A)(2), and 680.42(A)(1).

The added language is consistent with sections 352.10(B), 353.10(2), 355.10(B) and 362.10(3).

Public Input No. 4060-NFPA 70-2020 [Section No. 356.10]

356.10 Uses Permitted.

LFNC shall be permitted to be used in exposed or concealed locations for the following purposes:

(1) Where flexibility is required for installation, operation, or maintenance.

(2) Where protection of the contained conductors is required from vapors, machine oils, liquids, or solids.

(3) For outdoor locations where listed and marked as suitable for the purpose.

(4) For direct burial where listed and marked for the purpose.

(5) Type LFNC shall be permitted to be installed in lengths longer than 1.8 m (6 ft) where secured in accordance with 356.30.

(6) Type LFNC-B as a listed manufactured prewired assembly, metric designator 16 through 27 (trade size ½ through 1) conduit.

(7) For encasement in concrete where listed for direct burial and installed in compliance with 356.42.

(8) Conductors or cables rated at a temperature rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC.

(9) <u>In cable trays.</u>

Informational Note: Extreme cold can cause some types of nonmetallic conduits to become brittle and therefore more susceptible to damage from physical contact.

Statement of Problem and Substantiation for Public Input

Propose to "In cable trays" to complete the Uses Permitted and to line up with 392.10(A) and Table 392.10(A).

Submitter Information Verification

Submitter Full Name: Mathher Abbassi
Organization: New York City Department Of Buildings
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 19:38:33 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: LFNC is already permitted to be used in a cable tray system per 392.10(A) it is not necessary to repeat the rule in 350.10. This is consistent with other approved conduits and tubings for cable tray system whereas they do not have a section under Uses

Permitted for cable tray systems.

Public Input No. 4692-NFPA 70-2020 [Section No. 356.10]

356.10 Uses Permitted.

LFNC shall be permitted to be used in exposed or concealed locations for the following purposes:

(1) Where flexibility is required for installation, operation, or maintenance.

(2) Where protection of the contained conductors is required from vapors, machine oils, liquids, or solids.

(3) For outdoor locations where listed and marked as suitable for the purpose.

(4) For direct burial where listed and marked for the purpose.

(5) Type LFNC shall be permitted to be installed in lengths longer than 1.8 m (6 ft) where secured in accordance with 356.30.

(6) Type LFNC-B as a listed manufactured prewired assembly, metric designator 16 through 27 (trade size ½ through 1) conduit.

(7) For encasement in concrete where listed for direct burial and installed in compliance with 356.42.

(8) Conductors or cables rated at a temperature <u>higher than the listed temperature</u> rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC.

Informational Note: Extreme cold can cause some types of nonmetallic conduits to become brittle and therefore more susceptible to damage from physical contact.

Additional Proposed Changes

File Name	Description	Approved
CMP_8_TIA_1502_issued_TIA_70_20_10.pdf	NEC TIA 20-10 Log No. 1502	

Statement of Problem and Substantiation for Public Input

NOTE: This public input originates from Tentative Interim Amendment No. 20-10 (Log 1502) issued by the Standards Council on August 11, 2020 and per the NFPA Regs., needs to be reconsidered by the Technical Committee for the next edition of the Document.

Substantiation: The revision accepted by the panel in PI 1126 (submitted by NEMA) was incorrectly recorded in FR 7894. The highlighted text from the PI was not included in the FR.

PI 1126 text

(8) Conductors or cables rated at a temperature higher than the listed temperature rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC.

FR 7894 text

(8) Conductors or cables rated at a temperature rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC.

The text was correct in the task group report which is what the CMP reviewed at the panel meeting. The omission apparently occurred as the information was transferred from the WORD document to Terra and on to the written ballot. The vote on the FR was unanimous so it appears that the error was not noticed. The panel acted to accept a similar PI and FR for 350.10(4) for LFMC which is the same concept and where the proper text was balloted. 350.10 (4): Conductors or cables rated at a temperature higher than the listed temperature rating of LFMC conduit shall be permitted to be installed in LFMC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFMC per 110.14(C).

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular process. As currently covered in 2020 NEC 356.10(8), Conductors of a temperature rating higher than that of the LFNC are not permitted. Such prohibition never existed, was never proposed, nor was it considered at any point in the process.

Submitter Information Verification

Submitter Full Name: CMP ON NEC-P08

Organization: NEC Code-Making Panel 8

Street Address:

City:

State:

Zip:

Submittal Date: Thu Sep 10 16:53:01 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7502-NFPA 70-2020

Statement: The phrase "shall be permitted" does not add clarity. For consistency the phrase "shall be permitted to be" in 356.10(5) has been eliminated. The charging section already denotes "shall be permitted".

CMP-8 reaffirms the action on Tentative Interim Amendment No. 20-10 that adds the previously omitted text.

The addition of permission for use in corrosive environments is already approved use in Section 680.21(2), 680.23(B)(2), 680.23(F)(1), 680.25(A), 680.27(A)(2), and 680.42(A)(1).

The added language is consistent with sections 352.10(B), 353.10(2), 355.10(B) and 362.10(3).

Tentative Interim Amendment

NFPA® 70®

National Electrical Code®

2020 Edition

Reference: 356.10(8)
TIA 20-10
(SC 20-8-34 / TIA Log #1502)

Pursuant to Section 5 of the NFPA *Regulations Governing the Development of NFPA Standards*, the National Fire Protection Association has issued the following Tentative Interim Amendment to NFPA 70®, *National Electrical Code®,* 2020 edition. The TIA was processed by the National Electrical Code Panel 8 and the NEC Correlating Committee, and was issued by the Standards Council on August 11, 2020, with an effective date of August 31, 2020.

1. Revise 356.10 item (8) to read as follows:

356.10(8) Conductors or cables rated at a temperature <u>higher than the listed temperature</u> rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the LFNC.

Issue Date: August 11, 2020

Effective Date: August 31, 2020

(Note: For further information on NFPA Codes and Standards, please see www.nfpa.org/docinfo)

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NATIONAL FIRE PROTECTION ASSOCIATION

Public Input No. 1279-NFPA 70-2020 [Sections 356.24, 356.26]

Sections 356.24, 356.26

356.24 ~~Bends —~~ Bends

(A) How Made.

~~Bends in conduit shall be so made that the conduit is not damaged and the internal diameter of the conduit is not effectively reduced. Bends shall be permitted to be made manually without auxiliary equipment. The radius of the curve to the centerline of any bend shall not be less than shown in Table 2, Chapter 9 using the column "Other Bends."~~

~~**356.26** Bends —~~ (B) Number in One Run. ~~There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, for example, conduit bodies and boxes.~~

Statement of Problem and Substantiation for Public Input

Sections 356.24 and 356.26 have been combined into a single section for clarity and usability.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 28 10:40:20 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7535-NFPA 70-2020

Statement: This First Revision combines Sections 352.24 and 352.26 into a single Section for clarity and usability and clarifies the number of degrees of bends permitted to be used in a conduit run between pull points.

Public Input No. 2584-NFPA 70-2020 [Section No. 356.30]

356.30 Securing and Supporting.

~~Type~~

LFNC shall be securely fastened in place and supported in accordance with

~~one of the following: Where installed in lengths exceeding 1.8 m (6 ft), the conduit shall be securely fastened at intervals not exceeding 900 mm (3 ft) and~~

356.30(A) and (B).

356.30(A) Securely Fastened.

LFNC shall be securely fastened in place by an approved means within 300 mm (12 in.)

~~on~~

of each

~~side of every outlet~~

box,

~~junction box,~~

cabinet,

~~or fitting.~~

conduit body, or other conduit termination and shall be supported and secured at intervals not to exceed 1.4 m (4 1⁄ 2 ft). Where used, cable ties shall be listed

~~for the application~~

and be identified for

~~securing~~

securement and

~~supporting~~

support .

~~Securing or supporting of the conduit shall not be required where it is fished, installed in lengths not exceeding 900 mm (3 ft) at terminals where flexibility is required, or installed in lengths~~

Exception No. 1: Where LFNC is fished between access points through concealed spaces in finished buildings or structures and supporting is impractical.

Exception No. 2: Where flexibility is necessary after installation, lengths from the last point where the raceway is securely fastened shall not exceed the following:

(1) 900 mm (3 ft) for metric designators 16 through 35 (trade sizes 1/2 through 1 1/4

(2)1200 mm (4 ft) for metric designators 41 through 53 (trade sizes 1 1⁄ 2 through 2

(3) 1500 mm (5 ft) for metric designators 63 (trade size 2 1⁄ 2) and larger

Exception No. 3: Lengths not exceeding 1.8 m (6 ft) from a luminaire terminal connection for tap conductors to luminaires , as permitted in 410.117(C) .

- ~~Horizontal runs of LFNC supported by openings through framing members at intervals not exceeding 900 mm (3 ft) and securely fastened within 300 mm (12 in.) of termination points shall be permitted.~~

~~Securing or supporting of LFNC shall not be required where installed in lengths not~~

Exception No. 4: Lengths not exceeding 1.8 m (6 ft) from the last point where the raceway is securely fastened for connections within an accessible ceiling to

~~a~~

luminaire(s) or other equipment.

For the

~~purpose of~~ 356.30

purposes of the exceptions , listed

~~liquidtight flexible nonmetallic conduit~~

FMC fittings shall be permitted as a means of securement and support.

356.30(B) Supports.

Horizontal runs of FMC supported by openings through framing members at intervals not greater than 1.4 m (4 1⁄2 ft) and securely fastened within 300 mm (12 in.) of termination points shall be permitted.

Statement of Problem and Substantiation for Public Input

LFNC and LFMC are used in similar manners and often are used interchangeably. This change makes the securing and supporting rules for both of these products identical.
If the panel chooses not to accept this PI, they should at least modify list item (1) in current language. That language says that where the length of the LFNC does not exceed 6', there is no requirement to secure and support the raceway.

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 24 20:23:08 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: The submitter did not provide substantiation for why the distance between supports should be made smaller for this wiring method. LFNC is not the same as LFMC

Public Input No. 1337-NFPA 70-2020 [Section No. 356.60]

356.60 Equipment Grounding Conductor .

Where equipment ~~grounding~~ is required to be connected to the circuit equipment grounding conductor , a separate equipment grounding conductor of the wire type shall be installed in the conduit in accordance with 250 .118.

Exception No. 1: As permitted in 250.134, Exception No. 2, for dc circuits and 250.134, Exception No. 1, for separately run equipment grounding conductors.

Exception No. 2: ~~Where~~ The equipment grounding conductor shall not be required where the grounded conductor is used to ground equipment as permitted in 250.142 .

Statement of Problem and Substantiation for Public Input

No. 1. According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about 'Grounding.'
No. 2 Text revised to make it clear that we the conversation is about the connection to the equipment grounding conductor, not 'ground.'
No. 3 Revised the exception so that it matches the exception in 353.60.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 01 16:31:53 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter’s Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The grounding is not exclusive to Equipment Grounding Conductor. The Section is in place to address any grounding or bonding requirements. Section 250.118 does not have installation requirements for the equipment grounding conductors. Section 356.60 is intended to assure that where grounding was needed, that it was unacceptable to use non-metallic raceway as a bonding method. However, this section is intended to address all grounding needs whether that be for service as an Equipment Grounding Conductor, or other grounding needs such as equipotential bonding, static grounding, and in some cases lightning protection requirements associated with NFPA 780. Though it does apply to EGC’s, to dedicate this section solely to EGC’s changes its designed purpose to address all grounding and bonding needs and diminishes its full intent

Public Input No. 2916-NFPA 70-2020 [Section No. 358.2]

~~**358.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

~~**Electrical Metallic Tubing (EMT).**~~

~~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.~~

Statement of Problem and Substantiation for Public Input

The definition for EMT was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2890-NFPA 70-2020 [New Definition after Definition: Thermally Protected (as ap...]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:22:18 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3553-NFPA 70-2020 [Section No. 358.2]

(Relocate all definitions in the 358. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

358. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

Electrical Metallic Tubing (EMT).

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.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 08 22:10:40 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 1280-NFPA 70-2020 [Section No. 358.10]

358.10 Uses Permitted.

(A) Exposed and Concealed.

The use of EMT shall be permitted for both exposed and concealed work for the following:

(1) In concrete, in direct contact with the earth or in areas subject to severe corrosive influences where installed in accordance with 358.10(B)

(2) In dry, damp, and wet locations

(3) In any hazardous (classified) location as permitted by other articles in this *Code*

(4) <u>In direct burial applications when used with fittings listed for a wet location.</u>

(B) Corrosive Environments.

(1) Galvanized Steel and Stainless Steel EMT, Elbows, and Fittings.

Galvanized steel and stainless steel EMT, elbows, and fittings shall be permitted to be installed in concrete, in direct contact with the earth, or in areas subject to severe corrosive influences where protected by corrosion protection and approved as suitable for the condition.

(2) Supplementary Protection of Aluminum EMT.

Aluminum EMT shall be provided with approved supplementary corrosion protection where encased in concrete or in direct contact with the earth.

(C) Cinder Fill.

Galvanized steel and stainless steel EMT shall be permitted to be installed in cinder concrete or cinder fill where subject to permanent moisture when protected on all sides by a layer of noncinder concrete at least 50 mm (2 in.) thick or when the tubing is installed at least 450 mm (18 in.) under the fill.

(D) Wet Locations.

All supports, bolts, straps, screws, and so forth shall be of corrosion-resistant materials or protected against corrosion by corrosion-resistant materials.

Informational Note: See 300.6 for protection against corrosion.

(E) Physical Damage.

Steel and stainless steel EMT shall be permitted to be installed where subject to physical damage.

Statement of Problem and Substantiation for Public Input

Section 358.10 was revised to add a new section (4) to permit EMT to be used in direct burial application for clarity. The current UL Directory recognizes the use of EMT for direct burial applications.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:

Zip:

Submittal Date: Thu May 28 10:44:00 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7591-NFPA 70-2020

Statement: List item 4 is added to clarify that EMT is permitted for direct burial applications. The current UL Directory recognizes the use of EMT for direct burial applications. There is a companion PI adding EMT to table 300.5 column 2. The fittings used for direct burial applications shall be listed and identified for the purpose.

List item 5 is added to address changes made by Code panel 7, that added EMT to 604.100(A)(2) permitting it to be used as a manufactured wiring system. This first revision adds permission under section 358.10(5) to correlate with the changes made to 604.100(A)(2).

Public Input No. 213-NFPA 70-2019 [Section No. 358.12]

358.12 Uses Not Permitted.

EMT shall not be used under the following conditions:

(1) Where subject to severe physical damage

(2) For the support of luminaires or other equipment except conduit bodies no larger than the largest trade size of the tubing

(3) Where subject to foot traffic

Statement of Problem and Substantiation for Public Input

Foot traffic leads to the EMT pulling apart at the couplings or connectors. This can be from stepping on the EMT repeatedly, or accidentally tripping on it. I've seen this many times over the course of my career.

Note: This change would not prohibit the use of EMT on floors, roofs, or other flat surfaces. It would only prohibit the use of EMT where subject to foot traffic.

Submitter Information Verification

Submitter Full Name: Nick Sasso
Organization: Clark County Building and Fire
Street Address:
City:
State:
Zip:
Submittal Date: Fri Dec 27 11:19:00 EST 2019
Committee: NEC-P08

Committee Statement

Resolution: EMT is not permitted to be used were subject to severe physical damage. The submitter did not provide substantiation that foot traffic results in severe physical damage. Adding the specific condition “where subject to foot traffic” restricts the judgment of the AHJ.

Public Input No. 3319-NFPA 70-2020 [Section No. 358.14]

358.~~14~~ ~~Dissimilar~~ 14 D issimilar Metals.

Where practicable, dissimilar metals in contact anywhere in the raceway system shall be avoided to eliminate the possibility of galvanic action. Raceway system components made of the same material shall be permitted to be used together, additionally the following dissimilar metallic combinations may be used:

(1) Stainless steel and aluminum fittings and enclosures shall be permitted to be used with

~~galvanized steel EMT, and galvanized steel~~

(1) EMT made of galvanized steel.

(2) **Stainless steel and aluminum fittings and enclosures shall be permitted to be used with**

~~aluminum EMT where not subject to severe corrosive influences. Stainless steel EMT shall only be used with the following:~~

- ~~Stainless steel fittings~~
- ~~Stainless steel boxes and enclosures~~

~~Steel (galvanized, painted, powder or PVC coated, and so forth) boxes and enclosures when~~

(1) **EMT made of stainless steel.**

(2) **Galvanized or stainless steel fittings and enclosures shall be permitted to be used with EMT made of aluminum where the dissimilar metal connection is not subject to severe corrosive influences**

~~Stainless steel, nonmetallic, or approved accessories~~

(1) ~~.~~

~~**Note: Transitions of EMT to and from non-metallic materials are not prohibited by this section if permitted elsewhere in the code.**~~

Statement of Problem and Substantiation for Public Input

The existing 2020 language in this section is written such to prohibit the use of stainless steel EMT with anything other than stainless EMT accessories. Not even non-metallic connections are permitted.

This section of the code should be clear that it only applies to the EMT fittings and raceways. If they happen to connect to a non-metallic enclosure that is already handled elsewhere in the code. The galvanic corrosion differences between stainless, aluminium and galvanized materials should be spelled out as to what is/isn't permissible by the code. If this is not practical CMP should simply leave this as a design issue and only prohibit the 'worst offending' combinations such that the rule does not prohibit combinations in environments that may be acceptable.

If CMP is concerned about the electrical integrity of certain raceways of dissimilar metals perhaps a rule should be added generically requiring a 'wire type' EGC in such raceway installations.

This same change is being submitted for Article 342, 344, and 358

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3316-NFPA 70-2020 [Section No. 344.14]	Same change for additional wiring method
Public Input No. 3318-NFPA 70-2020 [Section No. 342.14]	Same change for additional wiring method

Submitter Information Verification

Submitter Full Name: Chris Rettger
Organization:
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 07 22:06:44 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: Section 358.14 is provided to clarify when and what is acceptable as far as dissimilar metals. Non-metallic connections would not apply under section 358.14. The current information is clear on what dissimilar metals are acceptable to be used with one another. Stainless steel and aluminum are not galvanically compatible.

Public Input No. 1226-NFPA 70-2020 [New Section after 358.20]

358.?? Standard Length.

The standard length of EMT shall be 3.05 m (10 ft).

Statement of Problem and Substantiation for Public Input

This change will formalize what is already standard industry practice. The NEC has improved significantly in large part due to improved formatting, use of language and consistency of requirements and application. This change will continue the trend of making the NEC consistent and predictable.

Submitter Information Verification

Submitter Full Name: Gary Hein

Organization: Submission is independent of employer.

Street Address:

City:

State:

Zip:

Submittal Date: Sat May 23 11:01:06 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: The NEC is not a design manual or product standard, standard length information is not necessary.

Public Input No. 2426-NFPA 70-2020 [Section No. 358.20(B)]

(B) Maximum.

The maximum size of EMT shall be metric designator ~~103~~ 155 (trade size ~~4~~ 6).

Informational Note: See 300.1(C) for the metric designators and trade sizes. These are for identification purposes only and do not relate to actual dimensions.

Statement of Problem and Substantiation for Public Input

There is customer desire for a larger diameter lighter weight metallic conduit that is not being addressed in the current code; allowance for 5 and 6 inch trade size EMT will address this market.

The purposed 5 & 6 EMT trade sizes will be made from the same materials as the 5 & 6 RMC trade sizes which have a proven industry track record.

The Outer diameter of the 5 & 6 EMT trade sizes will be the same as the 5 & 6 RMC trade sizes but with a thinner wall.

5 & 6 EMT trade sizes conform to the minimum bend radii given by Chapter 9 Table 2 of the NEC and have been verified using industry calculations and computational analysis.

The same methods of calculating wire fill given by Chapter 9 Tables 4, C.1,&C.1(A) will also apply to the purposed 5 & 6 EMT trade sizes; the purposed EMT sizes will have the same profile, Outer diameter, and be constructed with the same materials used by the equivalent RMC trade sizes so there is a negligible concern that the thinner wall will impact wire pulling.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2427-NFPA 70-2020 [Section No. Table]	
Public Input No. 2670-NFPA 70-2020 [Section No. Table]	
Public Input No. 2673-NFPA 70-2020 [Section No. Table]	

Submitter Information Verification

Submitter Full Name: Omar Lopez
Organization: ABB
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 20 14:24:24 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7593-NFPA 70-2020

Statement: A first revision was created to revise 358.20(B) to allow for larger diameter light weight listed metal tubing that is not being addressed in the current code.

Public Input No. 1281-NFPA 70-2020 [Sections 358.24, 358.26]

Sections 358.24, 358.26

358.24 ~~Bends —~~ Bends

(A) How Made.

~~Bends shall be made so that the tubing is not damaged and the internal diameter of the tubing is not effectively reduced. The radius of the curve of any field bend to the centerline of the tubing shall not be less than shown in Table 2, Chapter 9 for one-shot and full shoe benders.~~

~~**358.26** Bends —~~ (B) Number in One Run. ~~There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, for example, conduit bodies and boxes.~~

Statement of Problem and Substantiation for Public Input

Sections 358.24 and 358.26 have been combined into a single section for clarity and usability.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 28 10:46:48 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7594-NFPA 70-2020

Statement: This First Revision combines Sections 358.24 and 358.26 into a single section for clarity and usability and clarifies the total degrees of bends permitted to be used in a conduit run between pull points.

Public Input No. 3276-NFPA 70-2020 [Section No. 358.26]

358.26 Bends — Number in One Run.

There shall not be more than ~~the equivalent of four quarter bends (~~ 360 degrees ~~total)~~ of bend between pull points, for example, conduit bodies and boxes.

Statement of Problem and Substantiation for Public Input

The language "four quarter bends" is unnecessary and can lead to misapplication of the rule. There are cases where the inspection authority uses that term to say that bends exceeding 90 degrees are not permitted. In other cases code users say that you only count the "quarter bends" and not the kicks and offsets in the run. Neither of those interpretations are the intent of the rule. This language removes those possible misapplications of the rule, but is not a technical change. The rule, after the change, still prohibits runs that have more than 360 degrees of bend between pull points.\ which is the actual intent of the rule.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3270-NFPA 70-2020 [Section No. 342.26]	same change different raceway
Public Input No. 3271-NFPA 70-2020 [Section No. 344.26]	same change different raceway
Public Input No. 3273-NFPA 70-2020 [Section No. 352.26]	same change different raceway
Public Input No. 3274-NFPA 70-2020 [Section No. 353.26]	same change different raceway
Public Input No. 3275-NFPA 70-2020 [Section No. 355.26]	same change different raceway
Public Input No. 3270-NFPA 70-2020 [Section No. 342.26]	
Public Input No. 3271-NFPA 70-2020 [Section No. 344.26]	
Public Input No. 3273-NFPA 70-2020 [Section No. 352.26]	
Public Input No. 3274-NFPA 70-2020 [Section No. 353.26]	
Public Input No. 3275-NFPA 70-2020 [Section No. 355.26]	

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 07 14:00:37 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7594-NFPA 70-2020

Statement: This First Revision combines Sections 358.24 and 358.26 into a single section for clarity and usability and clarifies the total degrees of bends permitted to be used in a conduit run between pull points.

Public Input No. 1899-NFPA 70-2020 [Section No. 358.30]

358.30 Securing and Supporting.

EMT shall be installed as a complete system in accordance with 300.18 and shall be securely fastened in place and supported in accordance with 358.30(A) and (B).

(A) Securely Fastened.

(1) EMT shall be securely fastened in place at intervals not to exceed 3 m (10 ft). ~~In addition, each EMT run between termination points~~

(2) EMT shall be securely fastened within ~~900 mm~~ 900 mm (~~3 ft~~ 3 ft) ~~of each~~ of each outlet box, junction box, device box, cabinet, ~~conduit~~ conduit body, or other ~~tubing~~ conduit termination.

Exception No. 1: Fastening of unbroken lengths shall be permitted to be increased to a distance of 1.5 m (5 ft) where structural members do not readily permit fastening within 900 mm (3 ft).

Exception No. 2: For concealed work in finished buildings or prefinished wall panels where such securing is impracticable, unbroken lengths (without coupling) of EMT shall be permitted to be fished.

(B) Supports.

Horizontal runs of EMT supported by openings through framing members at intervals not greater than 3 m (10 ft) and securely fastened within 900 mm (3 ft) of termination points shall be permitted.

Statement of Problem and Substantiation for Public Input

Make this important rule into a list (like 342 and 344), and I used the exact text from 342.30(A)(1) to be used for 358.30(A)(2) so that the language is consistent.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 14 12:01:38 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7607-NFPA 70-2020

Statement: Reformatted Securing and Supporting Sections into a list item format for clarity and usability.

Public Input No. 1172-NFPA 70-2020 [Section No. 358.30(A)]

(A) Securely Fastened.

EMT shall be securely fastened in place at intervals not to exceed 3 m (10 ft). In addition, each EMT run between termination points shall be securely fastened within 900 mm (3 ft) of each outlet box, junction box, device box, cabinet, conduit body, or other tubing termination. <u>Once securely fastened at 900 mm (3 ft) going into or coming out of a junxion box, outlet box, cabinet, conduit body, or other tubing termination, all EMT supports must be constantly measured at the same distance in consecutive intervals not to exceed 3m (10 ft).</u>

Exception No. 1: Fastening of unbroken lengths shall be permitted to be increased to a distance of 1.5 m (5 ft) where structural members do not readily permit fastening within 900 mm (3 ft).

Exception No. 2: For concealed work in finished buildings or prefinished wall panels where such securing is impracticable, unbroken lengths (without coupling) of EMT shall be permitted to be fished.

Additional Proposed Changes

File Name	Description	Approved
.1590015435432	Code Change	

Statement of Problem and Substantiation for Public Input

I believe having supports constant at the same measurement helps the conduit remain in place securely.

Submitter Information Verification

Submitter Full Name: Troy Mitchell
Organization: E Light
Affiliation: Apprentice
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 20 18:49:19 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: The requirements already state that the intervals shall not exceed 10 ft. The proposed language does not have the technical substantiation for changing the requirements for supports as it relates to the safety of the installation. Changing the current language would restrict the installer or AHJ from adjusting the spacing requirements when necessary for additional support.

Public Input No. 2846-NFPA 70-2020 [Section No. 358.30 [Excluding any Sub-Sections]]

EMT shall be installed as a complete system in accordance with 300.18 ~~and~~ or as a manufactured wiring system in accordance with article 604 and shall be securely fastened in place and supported in accordance with 358.30(A) and (B).

Statement of Problem and Substantiation for Public Input

There are places around the country that do not allow for flexible wiring methods. Using pre-fabricated modular systems in these places has become a challenge due to the fact that EMT and other rigid wiring systems were not allowed to be pre-wired and mentioned in article 604. This public input has been put in tandem with PI2840 and PI2841 to all the use of EMT in article 604 as a manufactured wiring device. This product will have to be UL listed and offers greater physical protection to the conductors than do the current wiring methods allowed in article. The conductors and connectors will be pre-installed negating any chance of damage to the conductors during installation.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2840-NFPA 70-2020 [Section No. 604.100(A)(2)]	Allows EMT as a wiring method in manufactured wiring systems
Public Input No. 2841-NFPA 70-2020 [Section No. 300.18]	Allow for EMT to be pre-wired

Submitter Information Verification

Submitter Full Name: Raymond Horner
Organization: Atkore International
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 02 14:25:24 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7591-NFPA 70-2020

Statement: List item 4 is added to clarify that EMT is permitted for direct burial applications. The current UL Directory recognizes the use of EMT for direct burial applications. There is a companion PI adding EMT to table 300.5 column 2. The fittings used for direct burial applications shall be listed and identified for the purpose.

List item 5 is added to address changes made by Code panel 7, that added EMT to 604.100(A)(2) permitting it to be used as a manufactured wiring system. This first revision adds permission under section 358.10(5) to correlate with the changes made to 604.100(A)(2).

Public Input No. 2002-NFPA 70-2020 [Section No. 358.42]

358.42 Couplings and Connectors.

Couplings and connectors used with EMT shall be made up tight. Where buried in masonry or concrete, they shall be concretetight type. Where installed in wet locations, they shall ~~comply with 314.15 .~~ be listed for use in wet locatoins.

Statement of Problem and Substantiation for Public Input

The rules in 314.15 that apply to wet locations require the fitting to be listed for use in a wet location. It would be so much better to have this requirement in this Article.

Submitter Information Verification

Submitter Full Name:	Mike Holt
Organization:	Mike Holt Enterprises Inc
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Fri Jul 24 16:54:46 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: There are additional requirements listed in Section 314.15 that should be referenced in addition to wet location listings. Wet location requirements for fittings are also required under other sections.

Public Input No. 1338-NFPA 70-2020 [Section No. 358.60]

358.60 Use as Equipment Grounding Conductor .

EMT shall be permitted as an equipment grounding conductor in accordance with 250 .118.

Statement of Problem and Substantiation for Public Input

No. 1. According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the use of EMT as an equipment grounding conductor, not about 'Grounding.'
No. 2 Added reference to 250.118 to help the Code user understand when EMT is permitted to serve as the EGC.

Submitter Information Verification

Submitter Full Name:	Mike Holt
Organization:	Mike Holt Enterprises Inc
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Mon Jun 01 16:34:54 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter's Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The grounding is not exclusive to Equipment Grounding Conductor. The Section is in place to address any grounding or bonding requirements. Section 250.118 does not have installation requirements for the equipment grounding conductors.

Public Input No. 362-NFPA 70-2020 [Section No. 358.60]

358.60 Grounding.

EMT shall be permitted as an equipment grounding conductor.

Exception: When EMT is used in a wet location, an equipment grounding conductor of the wire type shall be installed in the raceway and sized according to 250.122.

Statement of Problem and Substantiation for Public Input

Most EMT raintight compression-type connectors have a gasket that goes between the connector and the outlet, boxes, conduit boxes or enclosures. These connectors have a plastic or silicone ring inside that provides a barrier to prevent moisture from entering the connector, this is the same for couplings. Raintight fittings may not have adequate surface contact area to the raceway and be a reliable equipment grounding conductor. In addition, these fittings are subjected to separation if not installed correctly or if it is damaged this would result in an ineffective ground-fault return path. Article 440.9 requires an equipment grounding conductor of the wire type for use with compression-type fittings. It should apply to all wet locations, not just rooftop air-conditioning and refrigerator equipment.

Submitter Information Verification

Submitter Full Name:	Scott Cameron
Organization:	True Electric LLC
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Fri Jan 24 01:39:29 EST 2020
Committee:	NEC-P08

Committee Statement

Resolution: EMT is permitted as an equipment grounding conductor per section 250.118. The submitter did not provide technical substantiation for requiring a supplemental insulated equipment grounding conductor.

Public Input No. 4470-NFPA 70-2020 [Section No. 358.60]

358.60 Grounding.

EMT shall be permitted as an equipment grounding conductor. All home runs shall contain an insulated equipment grounding conductor to insure an effective ground fault current path over the life of the installation.

Statement of Problem and Substantiation for Public Input

In may cases the EMT raceways and fittings become loose, corroded or damaged thus the integrity of the ground fault return path is not compromised. Over the life of the EMT raceway installation the effective ground fault current path would be maintained if the EGC was installed. In many designs being done by engineering firms they are requiring the installation of the EGC. This also insures the electronic and digital equipment that is installed has the necessary grounding and bonding path maintained.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4463-NFPA 70-2020 [Section No. 344.60]	
Public Input No. 4452-NFPA 70-2020 [Section No. 342.60]	

Submitter Information Verification

Submitter Full Name: Wendell Whistler

Organization: IBEW Local 280

Street Address:

City:

State:

Zip:

Submittal Date: Thu Sep 10 13:35:45 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: RMC is permitted as an equipment grounding conductor per section 250.118. The submitter did not provide technical substantiation for requiring a supplemental insulated equipment grounding conductor.

Public Input No. 2917-NFPA 70-2020 [Section No. 360.2]

~~**360.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

~~**Flexible Metallic Tubing (FMT).**~~

~~A metal raceway that is circular in cross section, flexible, and liquidtight without a nonmetallic jacket.~~

Statement of Problem and Substantiation for Public Input

The definition for FMT was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2890-NFPA 70-2020 [New Definition after Definition: Thermally Protected (as ap...]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:23:55 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3555-NFPA 70-2020 [Section No. 360.2]

(Relocate all definitions in the 360. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

360. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

Flexible Metallic Tubing (FMT).

A metal raceway that is circular in cross section, flexible, and liquidtight without a nonmetallic jacket.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams

Organization: Delta Charter Township

Street Address:

City:

State:

Zip:

Submittal Date: Tue Sep 08 22:11:56 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 4068-NFPA 70-2020 [Section No. 360.10]

360.10 Uses Permitted.

FMT shall be permitted to be used for branch circuits as follows:

(1) In dry locations

(2) Where concealed

(3) In accessible locations

(4) For system voltages of 1000 volts maximum

(5) In cable trays

Statement of Problem and Substantiation for Public Input

Propose to "In cable trays" to complete the Uses Permitted and to line up with 392.10(A) and Table 392.10(A).

Submitter Information Verification

Submitter Full Name:	Mathher Abbassi
Organization:	New York City Department Of Buildings
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Wed Sep 09 19:49:19 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FMT is already permitted to be used in a cable tray system per 392.10(A) it is not necessary to repeat the rule in 360.10. This is consistent with other approved conduits and tubings for cable tray system whereas they do not have a section under Uses Permitted for cable tray systems.

Public Input No. 1227-NFPA 70-2020 [New Section after 360.24]

360.?? Securing and Supporting

Language from Article 348.30 could be adapted for this article.

Statement of Problem and Substantiation for Public Input

Add language detailing the requirements for securement and support.

The NEC has improved significantly in large part due to improved formatting, use of language and consistency of requirements and application. This change will continue the trend of making the NEC consistent and predictable.

Submitter Information Verification

Submitter Full Name:	Gary Hein
Organization:	Submission is independent of employer.
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Sat May 23 11:09:29 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: By adding this change we would be in violation of 2.1.4 of the NFPA 2020 Style Manual. Also 360.12 (6) prohibits lengths over six feet. Which makes securing or supporting unnecessary.

Public Input No. 1339-NFPA 70-2020 [Section No. 360.60]

360.60 Use as Equipment Grounding Conductor .

FMT shall be permitted as an equipment grounding conductor where installed in accordance with 250.118(7).

Statement of Problem and Substantiation for Public Input

No. 1. According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the use of the equipment grounding conductor, not about 'Grounding.'

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jun 01 16:38:10 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle to the title. The submitter’s Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The intent of this section is to address grounding in general which may include EGC purposes and other grounding and bonding needs.

Public Input No. 2918-NFPA 70-2020 [Section No. 362.2]

~~**362.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

~~**Electrical Nonmetallic Tubing (ENT).**~~

~~A nonmetallic, pliable, corrugated raceway of circular cross section with integral or associated couplings, connectors, and fittings for the installation of electrical conductors. ENT 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.~~

Statement of Problem and Substantiation for Public Input

The definition for ENT was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2890-NFPA 70-2020 [New Definition after Definition: Thermally Protected (as ap...]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:25:39 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the

2020 NEC Style Manual. (See PI 3863)

Public Input No. 3564-NFPA 70-2020 [Section No. 362.2]

(Relocate all definitions in the 362. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

362. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

Electrical Nonmetallic Tubing (ENT).

A nonmetallic, pliable, corrugated raceway of circular cross section with integral or associated couplings, connectors, and fittings for the installation of electrical conductors. ENT 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.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 07:57:20 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 2164-NFPA 70-2020 [Section No. 362.10]

362.10 Uses Permitted.

For the purpose of this article, the first floor of a building shall be that floor that has 50 percent or more of the exterior wall surface area level with or above finished grade. One additional level that is the first level and not designed for human habitation and used only for vehicle parking, storage, or similar use shall be permitted. The use of ENT and fittings shall be permitted in the following:

(1) In any building not exceeding three floors above grade as follows:

(2) For exposed work, where not prohibited by 362.12

(3) Concealed within walls, floors, and ceilings

(4) In any building exceeding three floors above grade, ENT shall be concealed within walls, floors, and ceilings where the walls, floors, and ceilings provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies. The 15-minute-finish-rated thermal barrier shall be permitted to be used for combustible or noncombustible walls, floors, and ceilings.

Exception to (2): Where a fire sprinkler system(s) is installed in accordance with NFPA 13-2016, Standard for the Installation of Sprinkler Systems, on all floors, ENT shall be permitted to be used within walls, floors, and ceilings, exposed or concealed, in buildings exceeding three floors abovegrade.

Informational Note: A finish rating is established for assemblies containing combustible (wood) supports. The finish rating is defined as the time at which the wood stud or wood joist reaches an average temperature rise of 121°C (250°F) or an individual temperature of 163°C (325°F) as measured on the plane of the wood nearest the fire. A finish rating is not intended to represent a rating for a membrane ceiling.

(5) In locations subject to severe corrosive influences as covered in 300.6 and where subject to chemicals for which the materials are specifically approved.

(6) In concealed, dry, and damp locations not prohibited by 362.12.

(7) Above suspended ceilings where the suspended ceilings provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies, except as permitted in 362.10(1)a.

Exception to (5): ENT shall be permitted to be used above suspended ceilings in buildings exceeding three floors above grade where the building is protected throughout by a fire sprinkler system installed in accordance with NFPA 13-2016, Standard for the Installation of Sprinkler Systems.

(8) Encased in poured concrete ~~, or embedded~~ floors, ceilings, walls, and slabs.

(9) Embedded in a concrete slab on grade where ENT is placed on sand or approved screenings, provided fittings identified for this purpose are used for connections.

(10) For wet locations indoors as permitted in this section or in a concrete slab on or belowgrade, with fittings listed for the purpose.

(11) Metric designator 16 through 27 (trade size ½ through 1) as listed manufactured prewired assembly.

(12) Conductors or cables rated at a temperature higher than the listed temperature rating of ENT shall be permitted to be installed in ENT, if the conductors or cables are not operated at a temperature higher than the listed temperature rating of the ENT.

Statement of Problem and Substantiation for Public Input

This Public Input is for clarity. The current 362.10(6) has two separate rules embedded in it. This Public Input separates the two rules into their own sections and clarifies that "Encased in Concrete" includes floors, ceilings, walls, and slabs. "Encased in Concrete" remains as 362.10(6), "Embedded in Concrete" becomes 362.10(7) and the remaining sections renumbered.

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 06 09:40:22 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7596-NFPA 70-2020

Statement: This First Revision separates 362.10(6) into two different sections, clarifies the requirements associated to the single section. Renumber the following sections accordingly.

362.10(2) and (5) was revised to require an approved automatic fire sprinkler system to be used on all floors for ENT to be used exposed in a building exceeding 3 floors.

This revision moves the reference to NFPA 13-2019, Standard for the Installation of Sprinkler Systems, to an Information Note per section 4.2 of the NEC Style Manual.

The term “above grade” is the proper term to be used for consistency since it is used in 362.10(5) Exception to 5. The Correlating Committee Task Group for the NEC Style Manual should consider revising the 2020 NEC Style Manual, Annex A to reflect the proper term to be used within the NEC.

Public Input No. 3017-NFPA 70-2020 [Section No. 362.10]

362.10 Uses Permitted.

For the purpose of this article, the first floor of a building shall be that floor that has 50 percent or more of the exterior wall surface area level with or above finished grade. One additional level that is the first level and not designed for human habitation and used only for vehicle parking, storage, or similar use shall be permitted. The use of ENT and fittings shall be permitted in the following:

(1) In any building not exceeding three floors above grade as follows:

  (2) For exposed work, where not prohibited by 362.12

  (3) Concealed within walls, floors, and ceilings

(4) In any building exceeding three floors above grade, ENT shall be concealed within walls, floors, and ceilings where the walls, floors, and ceilings provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies. The 15-minute-finish-rated thermal barrier shall be permitted to be used for combustible or noncombustible walls, floors, and ceilings.

Exception to (2): Where a fire sprinkler system(s) ~~is installed~~ installed in accordance with NFPA 13-2016, Standard for the Installation of Sprinkler Systems, or other approved automatic fire protection system, is installed on all floors, ENT shall be permitted to be used within walls, floors, and ceilings, exposed or concealed, in buildings exceeding three floors abovegrade.

Informational Note: A finish rating is established for assemblies containing combustible (wood) supports. The finish rating is defined as the time at which the wood stud or wood joist reaches an average temperature rise of 121°C (250°F) or an individual temperature of 163°C (325°F) as measured on the plane of the wood nearest the fire. A finish rating is not intended to represent a rating for a membrane ceiling.

(5) In locations subject to severe corrosive influences as covered in 300.6 and where subject to chemicals for which the materials are specifically approved.

(6) In concealed, dry, and damp locations not prohibited by 362.12.

(7) Above suspended ceilings where the suspended ceilings provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies, except as permitted in 362.10(1)a.

Exception to (5): ENT shall be permitted to be used above suspended ceilings in buildings exceeding three floors above grade where the building is protected throughout by a fire sprinkler system installed in accordance with NFPA 13-2016, Standard for the Installation of Sprinkler Systems, or other approved automatic fire protection system .

(8) Encased in poured concrete, or embedded in a concrete slab on grade where ENT is placed on sand or approved screenings, provided fittings identified for this purpose are used for connections.

(9) For wet locations indoors as permitted in this section or in a concrete slab on or belowgrade, with fittings listed for the purpose.

(10) Metric designator 16 through 27 (trade size ½ through 1) as listed manufactured prewired assembly.

(11) Conductors or cables rated at a temperature higher than the listed temperature rating of ENT shall be permitted to be installed in ENT, if the conductors or cables are not operated at a temperature higher than the listed temperature rating of the ENT.

Statement of Problem and Substantiation for Public Input

This revision is needed to recognize the fact that buildings constructed before the 2016 edition of NFPA13 would not comply with a sprinkler code that did not exist yet! What if the building was

constructed in 2012? or 2009? or even earlier? The present literal wording makes it impossible to install ENT today in any buildings constructed BEFORE the existence of NFPA 13-2016, even if the building has a fully functional automatic sprinkler system! Relief is needed to allow the use of ENT in buildings that have sprinkler systems that may not comply with NFPA 13-2016, but otherwise provide equivalent fire protection.
Other Code section that require automatic sprinkler systems do not specifically state which edition of the fire sprinkler code. See section 450.42 exception, 450.43(A) exception, and 700.10(D)(2)(1) for some examples of this wording.
Of course, by the time the 2023 edition of the NEC is published, the 2019 or 2022 edition of NFPA13 may be applicable, and any references to NFPA13- 2016 would need to be updated in the NEC to reflect these newer editions.

Submitter Information Verification

Submitter Full Name:	Russ Leblanc
Organization:	Leblanc Consulting Services
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Fri Sep 04 07:01:13 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7596-NFPA 70-2020

Statement: This First Revision separates 362.10(6) into two different sections, clarifies the requirements associated to the single section. Renumber the following sections accordingly.

362.10(2) and (5) was revised to require an approved automatic fire sprinkler system to be used on all floors for ENT to be used exposed in a building exceeding 3 floors.

This revision moves the reference to NFPA 13-2019, Standard for the Installation of Sprinkler Systems, to an Information Note per section 4.2 of the NEC Style Manual.

The term “above grade” is the proper term to be used for consistency since it is used in 362.10(5) Exception to 5. The Correlating Committee Task Group for the NEC Style Manual should consider revising the 2020 NEC Style Manual, Annex A to reflect the proper term to be used within the NEC.

Public Input No. 4067-NFPA 70-2020 [Section No. 362.10]

362.10 Uses Permitted.

For the purpose of this article, the first floor of a building shall be that floor that has 50 percent or more of the exterior wall surface area level with or above finished grade. One additional level that is the first level and not designed for human habitation and used only for vehicle parking, storage, or similar use shall be permitted. The use of ENT and fittings shall be permitted in the following:

(1) In any building not exceeding three floors above grade as follows:

  (2) For exposed work, where not prohibited by 362.12

  (3) Concealed within walls, floors, and ceilings

(4) In any building exceeding three floors above grade, ENT shall be concealed within walls, floors, and ceilings where the walls, floors, and ceilings provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies. The 15-minute-finish-rated thermal barrier shall be permitted to be used for combustible or noncombustible walls, floors, and ceilings.

Exception to (2): Where a fire sprinkler system(s) is installed in accordance with NFPA 13-2016, Standard for the Installation of Sprinkler Systems, on all floors, ENT shall be permitted to be used within walls, floors, and ceilings, exposed or concealed, in buildings exceeding three floors abovegrade.

Informational Note: A finish rating is established for assemblies containing combustible (wood) supports. The finish rating is defined as the time at which the wood stud or wood joist reaches an average temperature rise of 121°C (250°F) or an individual temperature of 163°C (325°F) as measured on the plane of the wood nearest the fire. A finish rating is not intended to represent a rating for a membrane ceiling.

(5) In locations subject to severe corrosive influences as covered in 300.6 and where subject to chemicals for which the materials are specifically approved.

(6) In concealed, dry, and damp locations not prohibited by 362.12.

(7) Above suspended ceilings where the suspended ceilings provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies, except as permitted in 362.10(1)a.

Exception to (5): ENT shall be permitted to be used above suspended ceilings in buildings exceeding three floors above grade where the building is protected throughout by a fire sprinkler system installed in accordance with NFPA 13-2016, Standard for the Installation of Sprinkler Systems.

(8) Encased in poured concrete, or embedded in a concrete slab on grade where ENT is placed on sand or approved screenings, provided fittings identified for this purpose are used for connections.

(9) For wet locations indoors as permitted in this section or in a concrete slab on or belowgrade, with fittings listed for the purpose.

(10) Metric designator 16 through 27 (trade size ½ through 1) as listed manufactured prewired assembly.

(11) Conductors or cables rated at a temperature higher than the listed temperature rating of ENT shall be permitted to be installed in ENT, if the conductors or cables are not operated at a temperature higher than the listed temperature rating of the ENT.

(12) In cable trays.

Statement of Problem and Substantiation for Public Input

Propose to "In cable trays" to complete the Uses Permitted and to line up with 392.10(A) and Table

392.10(A).

Submitter Information Verification

Submitter Full Name: Mathher Abbassi
Organization: New York City Department Of Buildings
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 19:47:10 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: ENT is already permitted to be used in a cable tray system per 392.10(A) it is not necessary to repeat the rule in 362.10. This is consistent with other approved conduits and tubings for cable tray system whereas they do not have a section under Uses Permitted for cable tray systems

Public Input No. 1283-NFPA 70-2020 [Sections 362.24, 362.26]

Sections 362.24, 362.26

362.24 ~~Bends —~~ Bends

(A) How Made.

~~Bends shall be so made that the tubing will not be damaged and the internal diameter of the tubing will not be effectively reduced. Bends shall be permitted to be made manually without auxiliary equipment, and the radius of the curve to the centerline of such bends shall not be less than shown in Table 2, Chapter 9 using the column "Other Bends."~~

~~**362.26**~~ ~~Bends —~~ (B) Number in One Run. ~~There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, for example, conduit bodies and boxes.~~

Statement of Problem and Substantiation for Public Input

Sections 362.24 and 362.26 have been combined into a single section for clarity and usability.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 28 10:54:02 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7549-NFPA 70-2020

Statement: This First Revision combines Sections 362.24 and 362.26 into a single section for clarity and usability and clarifies the number of degrees of bends permitted to be used in a tubing run between pull point.

Public Input No. 986-NFPA 70-2020 [Section No. 362.30(B)]

(B) Supports.

Horizontal runs of ENT supported by openings in framing members at intervals not exceeding 900 mm (3 ft) and securely fastened within 900 mm (3 ft) of termination points shall be permitted.

Exception: When used for Class 2 or Class 3 circuits, horizontal runs of ENT supported by openings in framing members shall be permitted to be at intervals not exceeding 1.8 m (6 ft)

Statement of Problem and Substantiation for Public Input

Article 725-24 requires that Class 2 and 3 circuits be supported in such a manner that the cable will not be damaged by normal building use. Additionally, this article requires that such cables shall be supported by straps, hangers, cable ties, or similar fittings designed and installed so as not to damage the cable. No specific support interval for these types of cables is specified. When installing these cables through openings in metal bar joists or other such framing members, it is possible to damage the cables during installation by abrasion and sharp edges of the framing members. By using ENT to both protect the cables as well as provide a path to run cables during the construction phase, the ability to protect these cables is improved at an acceptable cost. It could also be argued that the use of the ENT results in a better looking and more quality installation than cable alone, which is sure to sag since no support intervals are specified. Furthermore, using ENT as the wiring method during rough-in enables cable paths to be established between pull points (junction boxes) before other mechanical systems are roughed in, such as sprinkler and HVAC. The installation of sprinkler, HVAC and other building systems presents challenges for low voltage installers due to obstruction by these systems of the clear space required to access the structural ceiling area with scissor lifts, ladders and other such equipment. By installing ENT prior to these other mechanical systems, a raceway is established between wire pull points which allows the installation of low voltage systems to be accomplished without having to access the areas between pull points with scissor lifts and like equipment, which is difficult to impossible after the other mechanical systems have been installed. Additionally, the requirement to support the raceway every 3 feet negates the advantage of using ENT to establish a raceway because to do so the building spaces have to be accessed every 3 feet to install the support wires or whatever method you use to provide the additional support. Therefore, it makes no sense for the NEC to permit class 2 and 3 circuit cables to be installed without specific support requirements but when those same cables are placed within ENT- not because they are required to be, but for the goal of completing a more professional and workmanlike installation- they now have to be supported every 3 feet.

Submitter Information Verification

Submitter Full Name: David Gideon

Organization: Building Controls LLC

Street Address:

City:

State:

Zip:

Submittal Date: Wed May 06 17:27:06 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: A technical substantiation needs to be submitted that demonstrates the safe use of ENT when used in horizontal runs supported by openings in framing members at intervals of 1.8 m (6 ft).

Public Input No. 3861-NFPA 70-2020 [Section No. 362.56]

362.56 Splices and Taps.

Splices and taps shall be made only in accordance with 300.15.

Informational Note: See ~~Article~~ 314.1 for rules on the installation and use of boxes and conduit bodies.

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the 2020 NEC(r) Style Manual prohibits reference to an entire article, other than Article 100. As such, it is proposed to revise this reference to the scope of the article. Alternatively, the CMP may with to identify the specific part of the article if that is preferred.

Submitter Information Verification

Submitter Full Name:	Richard Holub
Organization:	The DuPont Company, Inc.
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Wed Sep 09 14:11:54 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7550-NFPA 70-2020

Statement: The Informational Note was deleted since the reference to Article 314 was in general and not to a specific section. A reference to an Article in general is a violation of Section 4.1.4 of the 2020 NEC Style Manual.

Public Input No. 1340-NFPA 70-2020 [Section No. 362.60]

362.60 Equipment Grounding Conductor .

Where equipment

~~grounding~~
is required to be connected to the circuit equipment grounding conductor , a separate equipment grounding conductor of the wire type shall be installed in the raceway in

~~compliance~~
accordance with

~~Article 250, Part VI.~~
250.118.

Exception No. 1: The equipment grounding conductor shall be permitted to be run separately from the raceway where used for grounding dc circuits as permitted in 250.134, Exception No. 2.

Exception No. 2: The equipment grounding conductor shall not be required where the grounded conductor is used as part of the effective ground-fault path as permitted in 250.142.

Statement of Problem and Substantiation for Public Input

No. 1. According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about "Grounding." No. 2. I copied the text from 352.60 to this section so that the rules for all nonmetallic raceway rules are identical and revised it slightly to match all other PIs on this xxx.60 rule.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 01 16:42:26 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle to the title. The submitter's Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The Section is in place to address any grounding or bonding requirements. 250.118 is the incorrect referenced since 250.118 does not have installation requirements for wire type equipment grounding conductors in ENT.

Public Input No. 2920-NFPA 70-2020 [Section No. 366.2]

~~**366.2** Definitions.~~

~~The definitions in this section shall apply within this article and throughout the *Code* .~~

~~**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.~~

~~**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.~~

Statement of Problem and Substantiation for Public Input

The definition for Auxiliary Gutters were deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2892-NFPA 70-2020 [New Definition after Definition: Guest Suite.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:27:41 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a

single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3565-NFPA 70-2020 [Section No. 366.2]

(Relocate all definitions in the 366. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

366. 2 Definitions.

The definitions in this section shall apply within this article and throughout the *Code*.

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.

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.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 07:58:43 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 1544-NFPA 70-2020 [Section No. 366.10]

366.10 Uses Permitted.

(A) Sheet Metal Auxiliary Gutters.

(1) Indoor and Outdoor Use.

Sheet metal auxiliary gutters shall be permitted for indoor and outdoor use.

(2) Wet Locations.

Sheet metal auxiliary gutters installed in wet locations shall be suitable for such locations.

(B) Nonmetallic Auxiliary Gutters.

Nonmetallic auxiliary gutters shall be listed for the maximum ambient temperature of the installation and marked for the installed conductor insulation temperature rating.

Informational Note: Extreme cold may cause nonmetallic auxiliary gutters to become brittle and therefore more susceptible to damage from physical contact.

(1) Outdoors.

Nonmetallic auxiliary gutters shall be permitted to be installed outdoors where listed and marked as suitable for the purpose.

(2) Indoors.

Nonmetallic auxiliary gutters shall be permitted to be installed indoors.

(C) Auxiliary gutter shall be permitted to extend a distance not greater than 9 m (30 ft) beyond the equipment that it supplements.

Exception: As permitted in 620.35 for elevators, an auxiliary gutter shall be permitted to extend a distance greater than 9 m (30 ft) beyond the equipment it supplements.

Statement of Problem and Substantiation for Public Input

366.10 should address uses permitted and the uses permitted by exception.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jun 16 12:23:32 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7609-NFPA 70-2020

Statement: This first revision clarifies the uses permitted and associated exception for auxiliary gutters up to and over 30 ft. This revision does not change existing requirements, it only changes the structure of the requirement for improved clarity.

Public Input No. 1546-NFPA 70-2020 [Section No. 366.12]

366.12 Uses Not Permitted.

Auxiliary gutters shall not be used:

(1) To enclose switches, overcurrent devices, appliances, or other similar equipment

(2) To extend ~~a~~ a distance greater ~~distance~~ than 9 m (30 ft) beyond the equipment that it supplements

Exception: As permitted in 620.35 for elevators, an auxiliary gutter shall be permitted to extend a distance greater than 9 m (30 ft) beyond the equipment it supplements.

Informational Note: For wireways, see Articles 376 and 378. For busways, see Article 368.

Statement of Problem and Substantiation for Public Input

366.12 should only address uses not permitted, which are the distances beyond 30 feet. This proposed revision is intended to improve clarity and usability without impacting or changing technical content.

Submitter Information Verification

Submitter Full Name: Agnieszka Golriz
Organization: NECA
Street Address:
City:
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Submittal Date: Tue Jun 16 12:25:37 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7610-NFPA 70-2020

Statement: This first revision removes the distance related information in (2) to correlate with the uses permitted in 366.10.

The informational note in 366.12 is removed as it does not improve usability or clarity of the associated requirement.

Public Input No. 3862-NFPA 70-2020 [Section No. 366.12]

366.12 Uses Not Permitted.

Auxiliary gutters shall not be used:

(1) To enclose switches, overcurrent devices, appliances, or other similar equipment

(2) To extend a greater distance than 9 m (30 ft) beyond the equipment that it supplements

Exception: As permitted in 620.35 for elevators, an auxiliary gutter shall be permitted to extend a distance greater than 9 m (30 ft) beyond the equipment it supplements.

Informational Note: ~~For wireways, see Articles 376 and 378 . For busways, see Article 368 .~~ See 376.1 or 378.1 for wireways. See 368.1 for busways.

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the 2020 NEC(r) Style Manual prohibits reference to an entire article, other than Article 100. As such, it is proposed to revise these references to the scope of the respective articles and the informational note is reorganized in accordance with Section 4.1.3 of the NEC(r) Style Manual.

Submitter Information Verification

Submitter Full Name:	Richard Holub
Organization:	The DuPont Company, Inc.
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Wed Sep 09 14:15:19 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7610-NFPA 70-2020

Statement: This first revision removes the distance related information in (2) to correlate with the uses permitted in 366.10.

The informational note in 366.12 is removed as it does not improve usability or clarity of the associated requirement.

Public Input No. 3278-NFPA 70-2020 [Section No. 366.23]

366.23 Ampacity of Conductors.

(A) Sheet Metal Auxiliary Gutters.

The adjustment factors in 310.15(C)(1) shall be applied only where the number of current-carrying conductors, including neutral conductors classified as current-carrying under 310.15(E), exceeds 30 at any cross section of the sheet metal auxiliary gutter. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors. The current carried continuously in bare copper bars in sheet metal auxiliary gutters shall not exceed 1.55 amperes/mm^2 (1000 amperes/in.^{2}) of cross section of the conductor. For aluminum bars, the current carried continuously shall not exceed 1.09 amperes/mm^2 (700 amperes/in.^{2}) of cross section of the conductor.

Where adjustment factors are required to be applied, it shall be permitted to apply the provisions of the Exception to 310.14 (A)(2).

(B) Nonmetallic Auxiliary Gutters.

The adjustment factors specified in 310.15(C)(1) shall be applicable to the current-carrying conductors up to and including the 20 percent fill specified in 366.22(B). The provisions of the Exception to 310.14(A)(2) shall be permitted to be applied.

Statement of Problem and Substantiation for Public Input

There has been much debate on the internet code forums about the use of the Exception to 310.14(A)(2) for ampacity adjustment in wireways and gutters. Respected code authorities are not in agreement on the use of the exception. Where code experts are not in agreement on what the code requires, that is a strong indication that the code is not clear on the issue. This proposal is intended to add language to the code to make the issue clear.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3279-NFPA 70-2020 [Section No. 376.22(B)]	same change for wireways
Public Input No. 3279-NFPA 70-2020 [Section No. 376.22(B)]	

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 07 14:13:35 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: The existing language is clear and the proposed text is not necessary. The requirements in 366.23(A) are based on the number of current carrying conductors in a sheet metal auxiliary gutter. These requirements modify the “adjustment factors for more than three current-carrying conductors” where there are 30 or less current carrying conductors in the sheet metal auxiliary gutter. The requirements in 366.23(A) do not modify the adjustment factors where there are more than 30 current carrying conductors. Further, 366.23(A) does not modify the ambient temperature correction factors. As there is no modification for ambient temperature correction, the ambient temperature correction factors in 310.15(B) and the requirements and exception in 310.14(A)(2) apply.

Public Input No. 1341-NFPA 70-2020 [Section No. 366.60]

366.60 Equipment Grounding Conductor .

Metal auxiliary gutters shall be connected to an equipment grounding conductor(s), to an equipment bonding jumper, or to the grounded conductor where permitted or required by 250.92(B)(1) or 250.142.

Statement of Problem and Substantiation for Public Input

No. 1. According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about 'Grounding.'

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 01 16:46:16 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter's Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The Section is in place to address any grounding or bonding requirements.

Public Input No. 2589-NFPA 70-2020 [New Article after 368]

ARTICLE XXX. Insulated Bus Pipe

xxx.1 Scope. This article covers the use, installation, and construction specifications for Insulated Bus Pipe (IBP) Type IBP.

Informational Note: Insulated Bus Pipe (IBP) may also be referred to as Tubular Covered Conductor (TCC).

xxx.2 Definition.

Insulated Bus Pipe (IBP), Type 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.

xxx.3 Listing requirements. IBP and all associated fittings, connectors, and supports shall be listed.

xxx.10 Uses Permitted. IBP shall be permitted for use on power systems rated up to and including the maximum rated voltage of the IBP, located in accordance with xxx.10(A) through (D),

(1) **Exposed.** As exposed runs in accordance with 300.37.

(2) **Wet Locations .** IBP may be installed in wet or damp locations only when listed for such use.

(3) **Through Walls.** IBP shall be permitted to be installed through walls, in unbroken lengths. Where IBP penetrates an exterior wall, the entire length that penetrates the wall shall be listed for outdoor use, and the opening in the wall shall be sealed by an approved method.

(4) **Through Floors.** IBP shall be permitted to be extended vertically through dry floors if totally enclosed in metal where passing through the floor and for a minimum distance of 1.8 m (6 ft) above the floor to provide protection from physical damage.

xxx.12 Uses Not Permitted. IBP shall not be used under the following conditions:

(1) In any hazardous (classified) location except as permitted by other articles in this Code.

(2) For the support of luminaires or other equipment.

(3) Where concealed by the building structure.

(4) Where accessible to unqualified persons.

xxx.14 Installation . IBP shall be installed, terminated, and tested in accordance with the manufacturer's instructions by qualified persons.

xxx.30 Support. IBP shall be supported using only fittings and supports that are listed for use with the IBP, as specified in the installation instructions associated with the listing of the IBP.

xxx.80 Ampacity. IBP shall be used within the marked ampacity of the IBP.

xxx.90 Temperature Rating. IBP shall be used within the maximum rated conductor temperature.

xxx.100 Construction. IBP shall have solid or hollow copper, aluminum, or copper-clad aluminum conductor.

xxx.120 Marking.

(A) Required Information. All IBP shall be marked to indicate the following information, using the applicable method described in xxx.122 (B).

(1) The maximum rated voltage phase-to-phase or phase-to-ground.

(2) The maximum rated ampacity.

(3) The manufacturers name, trademark, or other distinctive marking by which the organization responsible for the product can be readily identified.

(4) The equivalent AWG size or circular mil area of the conductor.

(5) The maximum rated conductor temperature.

(6) The rated peak withstand current rating in rms symmetrical amperes or kA.

(7) Enclosure type designation, if other than Type 1.

(8) Rated short-time withstand current and duration if greater than 2 seconds.

(B) Method of Marking. One or more of the methods in xxx.120 (B)(1) or B(2) shall be used for marking of IBP.

(1) **Surface Marking.** IBP shall be durably marked on the surface. The required information does not need to be on each part of the IBP system, but may be located on one portion of the system, in a location that will be clearly visible after installation of the entire IBP system.

(2) **Tag Marking.** Metal or Corrugated Plastic covered, IBP shall be marked by means of an nameplate that is engraved, stamped, punched or printed with indelible print, and is permanently secured by means other than adhesive.

(C) Optional Markings. IBP shall be permitted to be marked to indicate special characteristics, such as limited smoke, sunlight resistance or others as applicable.

Additional Proposed Changes

File Name	Description	Approved
ARTICLE_XXX_IBP.docx	Word document version of the proposed article	

Statement of Problem and Substantiation for Public Input

Insulated bus pipe (IBP), also known as Tubular Covered Conductor (TCC), has been in use for many years in Europe in industrial and utility applications, in shipboard applications, and in utility applications throughout the United States. Insulated Bus Pipe systems are lighter, consume less volume, and may take less time to install than a traditional cable bus system. Insulated bus pipe has been proven as a viable alternative to using Type MV cables, bare busbars or bare conductors, and, if listed, will provide a level of safety equivalent or better than those wiring methods that are already allowed in locations accessible to qualified persons only. Insulated bus pipe can be Listed under the category of Insulated Bus Pipe (CVZL), using UL 1366.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2590-NFPA 70-2020 [Section No. 300.37]	Companion
Public Input No. 2590-NFPA 70-2020 [Section No. 300.37]	

Submitter Information Verification

Submitter Full Name: Paul Knapp
Organization: UL LLC
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 25 08:06:23 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7620-NFPA 70-2020

Statement: This First Revision adds a new article to NFPA 70 to address the installation of Insulated Bus Pipe (IBP), also known as Tubular Covered Conductor (TCC). IBP may achieve listing under the UL category of CVZL using the requirements published in UL 1366 the Outline of Investigation for Insulated Bus Pipe. Therefore, this proposed article requires IBP to be listed, installed, supported, terminated, and tested in accordance with the manufacturer's instructions by qualified persons.

Note: This FR contains the definitions to show the complete article in one location. During the SR stage the definition would then be moved to Article 100.

ARTICLE XXX

Insulated Bus Pipe: IBP/ Tubular Covered Conductors: TCC

xxx.1 Scope. This article covers the use, installation, and construction specifications for Insulated Bus Pipe (IBP) Type IBP.

Informational Note: IBP may also be referred to as tubular covered conductor (TCC).

xxx.2 Definition.

Insulated Bus Pipe (IBP), Type 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.

xxx.3 Listing requirements. IBP and all associated fittings, connectors, and supports shall be listed.

xxx.10 Uses Permitted. IBP shall be permitted for use on power systems rated up to and including the maximum rated voltage of the IBP, located in accordance with xxx.10(A) through (D),

(A) **Exposed.** As exposed runs in accordance with 300.37.

(B) **Wet Locations**. IBP may be installed in wet or damp locations only when listed for such use.

(C) **Through Walls.** IBP shall be permitted to be installed through walls, in unbroken lengths. Where IBP penetrates an exterior wall, the entire length that penetrates the wall shall be listed for outdoor use, and the opening in the wall shall be sealed by an approved method.

(D) **Through Floors.** IBP shall be permitted to be extended vertically through dry floors if totally enclosed in metal where passing through the floor and for a minimum distance of 1.8 m (6 ft) above the floor to provide protection from physical damage.

xxx.12 Uses Not Permitted. IBP shall not be used under the following conditions:

(1) In any hazardous (classified) location except as permitted by other articles in this Code.

(2) For the support of luminaires or other equipment.

(3) Where concealed by the building structure.

(4) Where accessible to unqualified persons.

xxx.14 Installation. IBP shall be installed, terminated, and tested in accordance with the manufacturer's instructions by qualified persons.

xxx.30 Support. IBP shall be supported using only fittings and supports that are listed for use with the IBP, as specified in the installation instructions associated with the listing of the IBP.

xxx.80 Ampacity. IBP shall be used within the marked ampacity of the IBP.

xxx.90 Temperature Rating. IBP shall be used within the maximum rated conductor temperature.

xxx.100 Construction. IBP shall have solid or hollow copper, aluminum, or copper-clad aluminum conductor.

xxx.120 Marking.

(A) Required Information. All IBP shall be marked to indicate the following information, using the applicable method described in xxx.122 (B).

(1) The maximum rated voltage phase-to-phase or phase-to-ground.

(2) The maximum rated ampacity.

(3) The manufacturers name, trademark, or other distinctive marking by which the organization responsible for the product can be readily identified.

(4) The equivalent AWG size or circular mil area of the conductor.

(5) The maximum rated conductor temperature.

(6) The rated peak withstand current rating in rms symmetrical amperes or kA.

(7) enclosure type designation, if other than Type 1.

(8) Rated short-time withstand current and duration if greater than 2 seconds.

(B) Method of Marking. One or more of the methods in xxx.120 (B)(1) or B(2) shall be used for marking of IBP.

(1) Surface Marking. IBP shall be durably marked on the surface. The required information does not need to be on each part of the IBP system, but may be located on one portion of the system, in a location that will be clearly visible after installation of the entire IBP system.**(2) Tag Marking.** Metal or Corrugated Plastic covered, IBP shall be marked by means of an nameplate that is engraved, stamped, punched or printed with indelible print, and is permanently secured by means other than adhesive.

(C) Optional Markings. IBP shall be permitted to be marked to indicate special characteristics, such as limited smoke, sunlight resistance or others as applicable.

Public Input No. 2921-NFPA 70-2020 [Section No. 368.2]

~~**368.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

~~**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.~~

~~Informational Note: For cablebus, refer to Article 370 .~~

Statement of Problem and Substantiation for Public Input

The definition for Busways was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2895-NFPA 70-2020 [New Definition after Definition: Building.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:29:21 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3569-NFPA 70-2020 [Section No. 368.2]

(Relocate all definitions in the 368. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

368. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

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.

Informational Note: For cablebus, refer to Article 370.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams

Organization: Delta Charter Township

Street Address:

City:

State:

Zip:

Submittal Date: Wed Sep 09 08:05:31 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3863-NFPA 70-2020 [Definition: Busway.]

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.

Informational Note: ~~For cablebus, refer to Article~~ See 370 .1 for cablebus.

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the 2020 NEC(r) Style Manual prohibits reference to an entire article, other than Article 100. As such, it is proposed to revise this reference to the scope of the article and the informational note is reorganized in accordance with Section 4.1.3 of the NEC(r) Style Manual.

Submitter Information Verification

Submitter Full Name:	Richard Holub
Organization:	The DuPont Company, Inc.
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Wed Sep 09 14:18:02 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 2094-NFPA 70-2020 [Section No. 368.56(B)]

(B) Cord and Cable Assemblies.

Suitable cord and cable assemblies identified for extra-hard usage or hard usage and listed bus drop cable shall be permitted as branches from busways for the connection of portable equipment or the connection of stationary equipment to facilitate their interchange in accordance with 400.10 and 400.12 and the following conditions:

(1) The cord or cable shall be attached to the building by an approved means.

(2) The length of the cord or cable from a busway plug-in device to a suitable tension take-up support device shall not exceed 1.8 m (6 ft).

(3) The cord and cable shall be installed as a vertical riser from the tension take-up support device to the equipment served.

(4) Strain relief cable grips shall be provided for the cord or cable at the busway plug-in device and equipment terminations.

Exception to (B)(2): In ~~industrial establishments~~ icontrolled access locations only, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, lengths exceeding 1.8 m (6 ft) shall be permitted between the busway plug-in device and the tension take-up support device where the cord or cable is supported at intervals not exceeding 2.5 m (8 ft).

Statement of Problem and Substantiation for Public Input

This exception shouldn't be limited to industrial locations. It should apply to any location that has controlled access where only trained workers are able to service the installation. The Department of Energy facilities, for example, are not necessarily "industrial" but have extremely strict rules for working on the premises. The contractors must undergo extensive training, work packages must be created, means and methods must all be approved. This is part of a series of proposals to change "industrial locations/premises/occupancies/wiring-systems/..." to "controlled access locations."

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2047-NFPA 70-2020 [Section No. 110.21(A)(2)]	part of global proposal to change 'industrial location' to 'controlled access location'
Public Input No. 2048-NFPA 70-2020 [Section No. 110.24(B)]	part of global proposal to change 'industrial location' to 'controlled access location'
Public Input No. 2049-NFPA 70-2020 [Section No. 110.70]	part of global proposal to change 'industrial location' to 'controlled access location'
Public Input No. 2050-NFPA 70-2020 [Section No. 210.8(B)]	part of global proposal to change 'industrial location' to 'controlled access location'
Public Input No. 2051-NFPA 70-2020 [Section No. 210.8(B)]	part of global proposal to change 'industrial location' to 'controlled access location'
Public Input No. 2052-NFPA 70-2020 [Section No. 210.9]	part of global proposal to change 'industrial location' to 'controlled access location'
Public Input No. 2053-NFPA 70-2020 [Section No. 210.18]	part of global proposal to change 'industrial location' to 'controlled access location'
Public Input No. 2054-NFPA 70-2020 [Section No. 215.11]	part of global proposal to change 'industrial location' to 'controlled access location'

Public Input No. 2087-NFPA 70-2020 [Section No. 225.37]	part of global proposal to change 'industrial location' to 'controlled access location'
Public Input No. 2088-NFPA 70-2020 [Section No. 225.52(A)]	part of global proposal to change 'industrial location' to 'controlled access location'
Public Input No. 2090-NFPA 70-2020 [Section No. 230.205(C)]	part of global proposal to change 'industrial location' to 'controlled access location'
Public Input No. 2091-NFPA 70-2020 [Section No. 240.21(C)(3)]	part of global proposal to change 'industrial location' to 'controlled access location'
Public Input No. 2092-NFPA 70-2020 [Section No. 300.50(A) [Excluding any Sub-Sections]]	part of global proposal to change 'industrial location' to 'controlled access location'
Public Input No. 2093-NFPA 70-2020 [Section No. 336.10]	part of global proposal to change 'industrial location' to 'controlled access location'

Submitter Information Verification

Submitter Full Name: Eric Stromberg
Organization: Los Alamos National Laboratory
Affiliation: Self
Street Address:
City:
State:
Zip:

Submittal Date: Wed Jul 29 21:55:34 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: The proposed language introduces an undefined term of “controlled access locations”. While the existing term of “industrial establishments” is widely used in industry, the proposed term could have the unintended consequence of misinterpreting what occupancies qualify as controlled access locations. For example, without a definition of the term, occupancies such as schools, airport terminals, and sports stadiums could be considered controlled access locations.

Public Input No. 1342-NFPA 70-2020 [Section No. 368.60]

368.60 Equipment Grounding Conductor .

Busway shall be connected to an equipment grounding conductor(s), to an equipment bonding jumper, or to the grounded conductor where permitted or required by 250.92(B)(1) or 250.142.

Statement of Problem and Substantiation for Public Input

No. 1. According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about 'Grounding.'

Submitter Information Verification

Submitter Full Name:	Mike Holt
Organization:	Mike Holt Enterprises Inc
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Mon Jun 01 16:47:59 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter’s Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The Section is in place to address any grounding or bonding requirements.

Public Input No. 2922-NFPA 70-2020 [Section No. 370.2]

~~**370.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

~~**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.~~

~~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.~~

Statement of Problem and Substantiation for Public Input

The definition for Cablebus was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2897-NFPA 70-2020 [New Definition after Definition: Cable Routing Assembly.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:31:23 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3573-NFPA 70-2020 [Section No. 370.2]

(Relocate all definitions in the 370. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

370. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

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.

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.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:

Submittal Date: Wed Sep 09 08:08:45 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the

2020 NEC Style Manual. (See PI 3863)

Public Input No. 3445-NFPA 70-2020 [New Definition after Definition: Cablebus.]

<u>**370.6 Listing Requirements**</u>

<u>Cablebus and accessories shall be listed and identified for such use. This listing requirement for cablebuss and accessories shall become effective on January 1, 2026.</u>

Statement of Problem and Substantiation for Public Input

In November, 2019 ANSI/CSA C22.2 No. 273 standard for Cablebus was published.
The scope of the standard covers:

1.1 This Standard applies to a complete cablebus system (termination to termination) and associated fittings rated at not more than 46 kV ac or dc, and intended for use in accordance with NFPA 70 (NEC), CSA C22.1 (CE Code, Part I), and CAN/CSA-C22.2 No. 0. These requirements do not apply to metal enclosed busways, as covered by CSA C22.2 No. 201 and CSA C22.2 No. 27/UL 857.

1.2 For the purpose of these requirements, a cablebus is an assembly of single conductors and/or cables designed as a system to transmit large magnitudes of electrical current and to withstand the effects of specified system requirements (i.e., short-circuit current, circuit loading, bonding, etc.) with fittings and conductor terminations in a completely enclosed, ventilated, or non-ventilated protective metal housing.

1.3 This Standard also applies to transition enclosures used for the transition between cablebus and adjoining equipment, where applicable.

Adding 370.6 with a future effective date will recognize the product safety standard and ensure consistent application of the product safety standard.

Submitter Information Verification

Submitter Full Name: Rudolph Garza

Organization: IAEI

Affiliation: IAEI

Street Address:

City:

State:

Zip:

Submittal Date: Tue Sep 08 15:09:18 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: The conductors used within a Cablebus assembly are generally listed. While many Cablebus systems are designed for a specific application, manufacturers design in accordance with, and many users specify compliance with IEEE C37.23-2015. Listing of Cablebus to ANSI/CSA C22.2 No. 273 is not prohibited by the Code and is done by some manufacturers today.

Public Input No. 1969-NFPA 70-2020 [Section No. 370.10]

370.10 Uses Permitted.

~~Approved~~ cablebus shall be permitted:

(1) At any voltage or current for which spaced conductors are rated and where installed only for exposed work, except as permitted in 370.18

(2) For branch circuits, feeders, and services

(3) To be installed outdoors or in corrosive, wet, or damp locations where identified for the use

Statement of Problem and Substantiation for Public Input

The proposed change is to ensure consistency with the other relevant Articles. This will improve clarity and usability.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: Nema
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jul 22 14:22:20 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7612-NFPA 70-2020

Statement: This first revision aligns the language with other relevant Articles in Chapter 3. The term indoors is added to clarify that cablebus is permitted indoors as well as in the other uses listed. These changes will improve clarity and usability.

Public Input No. 2070-NFPA 70-2020 [Section No. 370.10]

370.10 Uses Permitted.

~~Approved cablebus~~ Cablebus shall be permitted:

(1) At any voltage or current for which spaced conductors are rated and where installed only for exposed work, except as permitted in 370.18

(2) For branch circuits, feeders, and services

(3) To be installed indoors, outdoors or in corrosive, wet, or damp locations where identified for the use

Statement of Problem and Substantiation for Public Input

Removal of "approved" would align wording with other articles in Chapter 3; as an example, see Article 368.10. Change in Item (3) is to recognize use of cablebus "indoors".

Submitter Information Verification

Submitter Full Name:	Leonard Letea
Organization:	CSA Group
Affiliation:	This on behalf of CSA/ANSI C22.2 No. 273 (Cablebus) standard technical subcommittee.
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Tue Jul 28 10:12:13 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7612-NFPA 70-2020

Statement: This first revision aligns the language with other relevant Articles in Chapter 3. The term indoors is added to clarify that cablebus is permitted indoors as well as in the other uses listed. These changes will improve clarity and usability.

Public Input No. 2071-NFPA 70-2020 [Section No. 370.18]

370.18 Cablebus Installation.

~~**(A)** Transversely Routed.~~

Cablebus shall be permitted to extend transversely through partitions

~~or walls, other than fire walls, provided that the section within the wall is continuous, protected against physical damage, and unventilated.~~

~~**(B)** Through Dry Floors and Platforms.~~

~~Except where firestops are required, cablebus shall be permitted to extend vertically through dry floors and platforms, provided that the cablebus is totally enclosed at the point where it passes through the floor or platform and for a distance of 1.8 m (6 ft) above the floor or platform.~~

~~**(C)** Through Floors and Platforms in Wet Locations.~~

~~Except where firestops are required, cablebus shall be permitted to extend vertically through floors and platforms in wet locations where:~~

- ~~There are curbs or other suitable means to prevent waterflow through the floor or platform opening, and~~

~~Where the cablebus is totally enclosed at the point where it passes through the floor or platform and for a distance of 1.8 m (6 ft) above the floor or platform~~

and walls or vertically through platforms and floors in wet or dry locations where the installations, complete with the installed cables, are made in accordance with the requirements of 300.21 .

Statement of Problem and Substantiation for Public Input

This request is based on installation requirements for cable trays as a support system for cables and conductors. A Cablebus system is similar and also a support system for cables and conductors. The current requirements in 370.18 (A), (B), (C) can be met as the requirements provided in 300.21 (Spread of Fire or Products of Combustion). To be consistent for cable and conductor support systems in the code, the above new statement [similar to 392.18 (D)] should be permitted for Cablebus installations. With a reference to 300.21 and the informational note addresses installations in wet/dry locations, through floors and partitions, and where fire stops would be required. The current reference to fire stops in 370.18 does not give the installer clarification to meet minimum code without reference to the 300.21 additional informational note.

Submitter Information Verification

Submitter Full Name:	Leonard Letea
Organization:	CSA Group
Affiliation:	This on behalf of CSA/ANSI C22.2 No. 273 (Cablebus) standard technical subcommittee.
Street Address:	
City:	
State:	
Zip:	

Submittal Date: Tue Jul 28 10:17:02 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7613-NFPA 70-2020

Statement: This first revision simplifies the cablebus installation requirements and aligns the firestop requirements for Cablebus installation with the requirements for Cable Tray located in section 392.18(D). The requirements for a curb at floor penetrations in wet locations is removed as the Cablebus is suitable for wet locations and the associated curbing is a building code requirement.

Public Input No. 2398-NFPA 70-2020 [Section No. 370.20(A)]

(A) Conductors.

The current-carrying conductors in cablebus shall:

(1) Have an insulation rating of 75°C (167°F) or higher and be of an approved type suitable for the application.

(2) Be sized in accordance with the design of the cablebus but in no case be smaller than 1/0.

(3) <u>Neutral conductor, where required, shall be sized to carry all neutral load current, including harmonic currents, and shall have adequate momentary and short-circuit current rating consistent with system requirements.</u>

Statement of Problem and Substantiation for Public Input

Neutral conductors can be overloaded by harmonic currents. This change recognizes the potential problem with low-voltage conductors, and makes it consistent with 368.258 and other sections in this Code.

Submitter Information Verification

Submitter Full Name: David Bredhold

Organization: Db Technical Services

Street Address:

City:

State:

Zip:

Submittal Date: Wed Aug 19 07:07:02 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: The proposed section will introduce requirements that are difficult to verify and enforce without the results of a power study. Neutral sizing is addressed by the manufacturer of the equipment working in conjunction with the system designer based on the specific loading and circuit characteristics. Neutral sizing is addressed in other areas of this code and is not unique to Article 370.

Public Input No. 1970-NFPA 70-2020 [Section No. 370.42]

370.42 Fittings.

A cablebus system shall include ~~approved~~ fittings for the following:

(1) Changes in horizontal or vertical direction of the run

(2) Dead ends

(3) Terminations in or on connected apparatus or equipment or the enclosures for such equipment

(4) Additional physical protection where required, such as guards where subject to severe physical damage

Statement of Problem and Substantiation for Public Input

The proposed change is to ensure consistency with the other relevant Articles. This will improve clarity and usability.

Submitter Information Verification

Submitter Full Name: Megan Hayes

Organization: Nema

Street Address:

City:

State:

Zip:

Submittal Date: Wed Jul 22 14:25:25 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7614-NFPA 70-2020

Statement: This first revision aligns the language with other relevant Articles in Chapter 3. The term dead ends is removed as it does not apply to cablebus installations. These changes will improve clarity and usability.

Public Input No. 2072-NFPA 70-2020 [Section No. 370.42]

370.42 Fittings.

A cablebus system shall include ~~approved~~ fittings for the following:

(1) Changes in horizontal or vertical direction of the run

(2) ~~Dead ends~~

(3) Terminations in or on connected apparatus or equipment or the enclosures for such equipment

(4) Additional physical protection where required, such as guards where subject to severe physical damage

Statement of Problem and Substantiation for Public Input

Removal of “approved” would align wording with other articles in Chapter 3.
Removal of item (2) is because cablebus design does not have dead ends.

Submitter Information Verification

Submitter Full Name:	Leonard Letea
Organization:	CSA Group
Affiliation:	This on behalf of CSA/ANSI C22.2 No. 273 (Cablebus) standard technical subcommittee.
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Tue Jul 28 10:19:39 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7614-NFPA 70-2020

Statement: This first revision aligns the language with other relevant Articles in Chapter 3. The term dead ends is removed as it does not apply to cablebus installations. These changes will improve clarity and usability.

Public Input No. 1343-NFPA 70-2020 [Section No. 370.60]

370.60 Equipment Grounding Conductor .

A cablebus system shall be ~~grounded and/or~~ bonded as applicable:

(1) Cablebus framework, where bonded, shall be permitted to be used as the equipment grounding conductor for branch circuits and feeders.

(2) A cablebus installation shall be ~~grounded and~~ bonded in accordance with Article 250, excluding 250.86, Exception No. 2.

Statement of Problem and Substantiation for Public Input

No. 1. According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not 'Grounding.'
No. 2 Text revised to make it clear that we the rule is about the connection to the equipment grounding conductor, not 'ground.'

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:

Submittal Date: Mon Jun 01 16:49:37 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter's Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The Section is in place to address any grounding or bonding requirements.

Public Input No. 2073-NFPA 70-2020 [Section No. 370.60]

370.~~60~~ 60 Equipment Grounding.

A cablebus system shall be grounded and/or bonded as applicable:

(1) Cablebus framework, where bonded, shall be permitted to be used as the equipment grounding conductor for branch circuits and feeders.

(2) A cablebus installation shall be grounded and bonded in accordance with Article 250, excluding 250.86, Exception No. 2.

Statement of Problem and Substantiation for Public Input

This is part of a series of public input for Article 370. The addition of word “equipment” in the title is to align with terminology in Article 250.

Submitter Information Verification

Submitter Full Name:	Leonard Letea
Organization:	CSA Group
Affiliation:	This on behalf of CSA/ANSI C22.2 No. 273 (Cablebus) standard technical subcommittee.
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Tue Jul 28 10:22:48 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7615-NFPA 70-2020

Statement: The references to Article 250 are clarified to reference Parts V and VI as required by Section 4.1.4 of the 2020 NEC Style Manual.

Public Input No. 3867-NFPA 70-2020 [Section No. 370.60]

370.60 Grounding.

A cablebus system shall be grounded and/or bonded as applicable:

(1) Cablebus framework, where bonded, shall be permitted to be used as the equipment grounding conductor for branch circuits and feeders.

(2) A cablebus installation shall be grounded and bonded in accordance with Part IV and Part V of Article 250, excluding 250.86, Exception No. 2.

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the 2020 NEC(r) Style Manual prohibits reference to an entire article, other than Article 100. As such, it is proposed to point users to the specific parts of Article 250 as shown to comply.

Submitter Information Verification

Submitter Full Name: Richard Holub

Organization: The DuPont Company, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Wed Sep 09 14:20:49 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7615-NFPA 70-2020

Statement: The references to Article 250 are clarified to reference Parts V and VI as required by Section 4.1.4 of the 2020 NEC Style Manual.

Public Input No. 2074-NFPA 70-2020 [Section No. 370.120]

370.120 Marking.

~~Each section of cablebus shall be marked with the~~ (A) Nameplates. Each cablebus system shall include a nameplate at each terminating end of the system with the manufacturer's name or trade designation and the maximum diameter, number, voltage rating, and ampacity of the conductors to be installed. ~~Markings~~ Nameplates shall be located so as to be visible after installation.

(B) Identification. Each section and fitting of a cablebus system shall be identified.

Statement of Problem and Substantiation for Public Input

Proposed changes align with the product standard, ANSI/CSA C22.2 No. 273. This clarifies that a nameplate label is not required for each section of the cablebus system.
Added "(B) Identification" to clarify that each section and fittings need to be identified.

Submitter Information Verification

Submitter Full Name:	Leonard Letea
Organization:	CSA Group
Affiliation:	This on behalf of CSA/ANSI C22.2 No. 273 (Cablebus) standard technical subcommittee.
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Tue Jul 28 10:24:51 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7616-NFPA 70-2020

Statement: This first revision clarifies that cablebus systems are provided with two types of markings: Nameplates at each terminating end and markings to identify the pieces of the cablebus system for installation purposes. This first revision differentiates between the two types of markings.

Public Input No. 2924-NFPA 70-2020 [Section No. 372.2]

~~**372.2** Definitions.~~

~~The definitions in this section shall apply only within this article.~~

~~**Cell.**~~

~~A single, enclosed tubular space in a floor made of precast cellular concrete slabs, the direction of the cell being parallel to the direction of the floor member.~~

~~**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.~~

Statement of Problem and Substantiation for Public Input

The definition for Cellular Floor Raceways, Cell, and Header were deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2891-NFPA 70-2020 [New Definition after Definition: Raceway.]	
Public Input No. 2898-NFPA 70-2020 [New Definition after Definition: Cable Routing Assembly.]	
Public Input No. 2900-NFPA 70-2020 [New Definition after Definition: Handhole Enclosure.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:32:42 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a

single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3574-NFPA 70-2020 [Section No. 372.2]

(Relocate all definitions in the 372. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

372. 2 Definitions.

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

Cell.

A single, enclosed tubular space in a floor made of precast cellular concrete slabs, the direction of the cell being parallel to the direction of the floor member.

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.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams

Organization: Delta Charter Township

Street Address:

City:

State:

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Submittal Date: Wed Sep 09 08:10:29 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the

2020 NEC Style Manual. (See PI 3863)

Public Input No. 3491-NFPA 70-2020 [Definition: Cell.]

Relocate this definition to Article 100 and consider revising the definition to coordinate with the same term used in Article 374.

Cell.

A single, enclosed tubular space in a floor made of precast cellular concrete slabs, the direction of the cell being parallel to the direction of the floor member.

Statement of Problem and Substantiation for Public Input

The NEC Style Manual revisions in Section 2.2.2 and its subdivisions requires multiple changes to the definitions in Article 100 and all Articles in the NEC including the use of acronyms in Section 3.2.3. Section 2.2.2.4 Terms with Multiple Definitions. Where two or more definitions exist for a term, a task group shall be formed to work on the development of a single acceptable definition. When this cannot be accomplished, another term shall be selected or the term shall be identified in the context of the specific application.

Submitter Information Verification

Submitter Full Name: David Williams

Organization: Delta Charter Township

Street Address:

City:

State:

Zip:

Submittal Date: Tue Sep 08 17:20:06 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 2925-NFPA 70-2020 [Section No. 374.2]

~~**374.2** Definitions.~~

~~The definitions in this section shall apply within this article and throughout the *Code* .~~

~~**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.~~

~~***Cell.***~~

~~A single enclosed tubular space in a cellular metal floor member, the axis of the cell being parallel to the axis of the metal floor member.~~

~~***Header.***~~

~~A transverse raceway for electrical conductors, providing access to predetermined cells of a cellular metal floor, thereby permitting the installation of electrical conductors from a distribution center to the cells.~~

Statement of Problem and Substantiation for Public Input

The definitions for Cellular Metal Floor Raceways, Cell, and Header, were deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2891-NFPA 70-2020 [New Definition after Definition: Raceway.]	
Public Input No. 2898-NFPA 70-2020 [New Definition after Definition: Cable Routing Assembly.]	
Public Input No. 2900-NFPA 70-2020 [New Definition after Definition: Handhole Enclosure.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:

Submittal Date: Thu Sep 03 09:35:40 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3576-NFPA 70-2020 [Section No. 374.2]

(Relocate all definitions in the 374. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

374. 2 Definitions.

The definitions in this section shall apply within this article and throughout the *Code*.

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.

Cell.

A single enclosed tubular space in a cellular metal floor member, the axis of the cell being parallel to the axis of the metal floor member.

Header.

A transverse raceway for electrical conductors, providing access to predetermined cells of a cellular metal floor, thereby permitting the installation of electrical conductors from a distribution center to the cells.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name:	David Williams
Organization:	Delta Charter Township
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Wed Sep 09 08:12:01 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3494-NFPA 70-2020 [Definition: Cell.]

Relocate this definition to Article 100 and consider revising the definition to coordinate with the same term used in Article 372.

Cell.

A single enclosed tubular space in a cellular metal floor member, the axis of the cell being parallel to the axis of the metal floor member.

Statement of Problem and Substantiation for Public Input

The NEC Style Manual revisions in Section 2.2.2 and its subdivisions requires multiple changes to the definitions in Article 100 and all Articles in the NEC including the use of acronyms in Section 3.2.3. Section 2.2.2.4 Terms with Multiple Definitions. Where two or more definitions exist for a term, a task group shall be formed to work on the development of a single acceptable definition. When this cannot be accomplished, another term shall be selected or the term shall be identified in the context of the specific application.

Submitter Information Verification

Submitter Full Name: David Williams

Organization: Delta Charter Township

Street Address:

City:

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Submittal Date: Tue Sep 08 17:31:19 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 1070-NFPA 70-2020 [Section No. 374.6]

374.6 Listing Requirements.

Cellular metal floor raceways <u>and associated fittings</u> shall be listed.

Statement of Problem and Substantiation for Public Input

This proposal is to require that the fittings used with Cellular Metal Floor Raceways for Article 374 of the 2023 NEC be listed. An NEC requirement for listed cellular metal floor raceway fittings is equally as important as the NEC requirement for raceways to be listed due to Part III of Article 374 not containing sufficient requirements for fittings. Unfortunately when the Listing Requirements were added to Article 374 of the 2020 NEC, listed fittings were not included, nor were they included on the public input (PI 3498) that initiated the code revision. The ANSI Standard for Cellular Metal Floor Raceways & Fittings, UL 209, provides the accepted construction, performance and marking requirements for both raceways and fittings.

Submitter Information Verification

Submitter Full Name: David Gerstetter

Organization: UL LLC

Street Address:

City:

State:

Zip:

Submittal Date: Fri May 15 14:41:31 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7618-NFPA 70-2020

Statement: This change aligns the requirements with the ANSI Standard for Cellular Metal Floor Raceways & Fittings, UL 209 and clarifies that the construction, performance and marking requirements apply not only to raceway but also to the associated fittings.

Public Input No. 2927-NFPA 70-2020 [Section No. 376.2]

~~**376.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

~~**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.~~

Statement of Problem and Substantiation for Public Input

The definition for Metal Wireways was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2893-NFPA 70-2020 [New Definition after Definition: Weatherproof.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:38:13 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3577-NFPA 70-2020 [Section No. 376.2]

(Relocate all definitions in the 376. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

376. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

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.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:

Submittal Date: Wed Sep 09 08:13:53 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3279-NFPA 70-2020 [Section No. 376.22(B)]

(B) Adjustment Factors.

The adjustment factors in 310.15(C)(1) shall be applied only where the number of current-carrying conductors, including neutral conductors classified as current-carrying under 310.15(E), exceeds 30 at any cross section of the wireway. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors. <u>Where adjustment factors are required to be applied, it shall be permitted to apply the provisions of the Exception to 310.14(A)(2).</u>

Statement of Problem and Substantiation for Public Input

There has been much debate on the internet code forums about the use of the Exception to 310.14(A)(2) for ampacity adjustment in wireways and gutters. Respected code authorities are not in agreement on the use of the exception. Where code experts are not in agreement on what the code requires, that is a strong indication that the code is not clear on the issue. This proposal is intended to add language to the code to make the issue clear.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3278-NFPA 70-2020 [Section No. 366.23]	same change for gutters
Public Input No. 3278-NFPA 70-2020 [Section No. 366.23]	

Submitter Information Verification

Submitter Full Name: Don Ganiere

Organization: [Not Specified]

Street Address:

City:

State:

Zip:

Submittal Date: Mon Sep 07 14:20:20 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: The existing language is clear and the proposed text is not necessary. The requirements in 376.22(B) are based on the number of current carrying conductors in a wireway. These requirements modify the “adjustment factors for more than three current-carrying conductors” where there are 30 or less current carrying conductors in the wireway. The requirements in 376.22(B) do not modify the adjustment factors where there are more than 30 current carrying conductors. Further, 376.22(B) does not modify the ambient temperature correction factors. As there is no modification for ambient temperature correction, the ambient temperature correction factors in 310.15(B) and the requirements and exception in 310.14(A)(2) apply.

Public Input No. 789-NFPA 70-2020 [Section No. 376.22(B)]

(B) Adjustment Factors.

The adjustment factors in 310.15(C)(1) shall be applied only where the number of current-carrying conductors, including neutral conductors classified as current-carrying under 310.15(E), exceeds 30 at any cross section of the wireway and the provisions of 310 .14(A)(2), exception shall not apply. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.

Statement of Problem and Substantiation for Public Input

Metal wireways can often be overfilled with too many current carrying conductors. The practice of using the exception in 310.14 to allow the packing of current carrying conductors in these wireways must be restricted.

Submitter Information Verification

Submitter Full Name: Kenneth Valley

Organization: Ksv Electrical Seminars

Street Address:

City:

State:

Zip:

Submittal Date: Wed Mar 25 11:47:00 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: The existing language is clear and the proposed text is not necessary. The requirements in 376.22(B) are based on the number of current carrying conductors in a wireway. These requirements modify the “adjustment factors for more than three current-carrying conductors” where there are 30 or less current carrying conductors in the wireway. The requirements in 376.22(B) do not modify the adjustment factors where there are more than 30 current carrying conductors. Further, 376.22(B) does not modify the ambient temperature correction factors. As there is no modification for ambient temperature correction, the ambient temperature correction factors in 310.15(B) and the requirements and exception in 310.14(A)(2) apply.

Public Input No. 1609-NFPA 70-2020 [Section No. 376.23]

376.23 Insulated Conductors.

Insulated conductors installed in a metal wireway shall comply with 376.23(A) and (B).

(A) Deflected Insulated Conductors.

Where insulated conductors are deflected within a metal wireway, either at the ends or where conduits, fittings, or other raceways or cables enter or leave the metal wireway, or where the direction of the metal wireway is deflected greater than 30 degrees, dimensions corresponding to one wire per terminal in Table 312.6(A) shall apply.

(B) Metal Wireways Used as Pull Boxes.

Where a metal wireway is used as a pull box for insulated conductors 4 AWG or larger ~~are pulled through a wireway~~ , the ~~distance between raceway and cable entries enclosing the same conductor shall not be less than that required by~~ wireway shall be sized in accordance with 314.28(A) ~~(1) for straight pulls and 314~~ . ~~28(A)(2) for angle pulls.~~ When transposing cable size into raceway size, the minimum metric designator (trade size) raceway required for the number and size of conductors in the cable shall be used.

Statement of Problem and Substantiation for Public Input

My suggested edits is intended to make the rule simpler and clear. I have had engineers state that the way the rule is written, the distance only applies 'between raceway and cable entries.' We all agree that we are sizing the wireway the same as if it's a pull box, not the distance 'between raceway or cable entries.' So simply referencing 314.28(A) solves this issue.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jun 24 11:44:14 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: The existing language is clear. The proposed single reference to 314.28(A) would expand the language to not only include 314.28(A)(1) and 314.28(A)(2) as it does today, but would also include 314.28(A)(3). Permitting smaller dimensions could introduce confusion and does not clarify the requirements of the existing language.

Public Input No. 1728-NFPA 70-2020 [New Section after 376.58]

376.60 Equipment Grounding Conductor. Metal wireways shall be permitted as an equipment grounding conductor where installed in accordance with

250.118(13).

Statement of Problem and Substantiation for Public Input

All wiring methods have a xx.60 rule about the wiring method permitted us as an EGC. So it's appropiate to have this added to Article 376.

Submitter Information Verification

Submitter Full Name:	Mike Holt
Organization:	Mike Holt Enterprises Inc
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Thu Jun 25 15:56:40 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution:	FR-7619-NFPA 70-2020
Statement:	This change creates a new section permitting listed metal wireway to be used as an equipment grounding conductor. The new section title is consistent with other raceway articles and the language correlates with 250.118(13).

Public Input No. 2928-NFPA 70-2020 [Section No. 378.2]

~~**378.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

~~**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.~~

Statement of Problem and Substantiation for Public Input

The definition for Nonmetallic Wireways was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2893-NFPA 70-2020 [New Definition after Definition: Weatherproof.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 09:39:58 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3578-NFPA 70-2020 [Section No. 378.2]

(Relocate all definitions in the 378. 2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

378. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

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.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams

Organization: Delta Charter Township

Street Address:

City:

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Zip:

Submittal Date: Wed Sep 09 08:15:12 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 1344-NFPA 70-2020 [Section No. 378.60]

378.60 Equipment Grounding Conductor .

Where equipment ~~grounding~~ is required to be connected to the circuit equipment grounding conductor , a separate equipment grounding conductor of the wire type shall be installed in the nonmetallic ~~wireway.~~ wireway in accordance with 250.118. A separate equipment grounding conductor shall not be required where the grounded conductor is used to ground equipment as permitted in 250.142.

Statement of Problem and Substantiation for Public Input

No. 1. According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about "Grounding." No. 2. I copied the text from 352.60 to this section so that all nonmetallic raceway rules are identical and revised it slightly to match all other PIs on this xxx.60 rule.

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jun 01 16:53:35 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter's Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The grounding is not exclusive to Equipment Grounding Conductor. The Section is in place to address any grounding or bonding requirements. Section 250.118 does not have installation requirements for the equipment grounding conductors. Section 378.60 is intended to assure that where grounding was needed, that it was unacceptable to use non-metallic raceway as a bonding method. However, this section is intended to address all grounding needs whether that be for service as an Equipment Grounding Conductor, or other grounding needs such as equipotential bonding, static grounding, and in some cases lightning protection requirements associated with NFPA 780. Though it does apply to EGC's, to dedicate this section solely to EGC's changes its designed purpose to address all grounding and bonding needs and diminishes its full intent

Public Input No. 2942-NFPA 70-2020 [Section No. 384.2]

~~**384.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

~~**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.~~

Statement of Problem and Substantiation for Public Input

The definition for Strut-Type Channel Raceway was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2891-NFPA 70-2020 [New Definition after Definition: Raceway.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 13:21:44 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3581-NFPA 70-2020 [Section No. 384.2]

(Relocate all definitions in the 384.2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

384. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

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.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 08:17:58 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 1345-NFPA 70-2020 [Section No. 384.60]

384.60 Use as Equipment Grounding Conductor .

Strut-type channel raceway enclosures providing a transition to or from other wiring methods shall have a means for connecting an equipment grounding conductor. Strut-type channel raceways shall be permitted as an equipment grounding conductor in accordance with 250.118(13). Where a snap-fit metal cover for strut-type channel raceways is used to achieve electrical continuity in accordance with the listing, this cover shall not be permitted as the means for providing electrical continuity for a receptacle mounted in the cover.

Statement of Problem and Substantiation for Public Input

According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about 'Grounding.'

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 01 16:59:05 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter’s Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The Section is in place to address any grounding or bonding requirements.

Public Input No. 2943-NFPA 70-2020 [Section No. 386.2]

~~**386.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

~~**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.~~

Statement of Problem and Substantiation for Public Input

The definition for Surface Metal Raceway was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2891-NFPA 70-2020 [New Definition after Definition: Raceway.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 13:24:27 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3584-NFPA 70-2020 [Section No. 386.2]

(Relocate all definitions in the 386.2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

386. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

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.

Statement of Problem and Substantiation for Public Input

The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100.

Submitter Information Verification

Submitter Full Name: David Williams

Organization: Delta Charter Township

Street Address:

City:

State:

Zip:

Submittal Date: Wed Sep 09 08:20:05 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 1346-NFPA 70-2020 [Section No. 386.60]

386.60 Equipment Grounding Conductor .

Surface metal raceway enclosures providing a transition from other wiring methods shall have a means for connecting an equipment grounding conductor.

Statement of Problem and Substantiation for Public Input

According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about 'Grounding.'

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jun 01 17:00:57 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter's Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The Section is in place to address any grounding or bonding requirements.

Public Input No. 2945-NFPA 70-2020 [Section No. 388.2]

~~**388.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

~~**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.~~

Statement of Problem and Substantiation for Public Input

The definition for Surface Nonmetallic Raceway was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2891-NFPA 70-2020 [New Definition after Definition: Raceway.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 13:26:45 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3587-NFPA 70-2020 [Section No. 388.2]

(Relocate all definitions in the 388.2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

388. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

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.

Statement of Problem and Substantiation for Public Input

"The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100. "

Submitter Information Verification

Submitter Full Name:	David Williams
Organization:	Delta Charter Township
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Wed Sep 09 08:23:39 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 1347-NFPA 70-2020 [Section No. 388.60]

388.60 Equipment Grounding Conductor .

Where equipment ~~grounding~~ is required to be connected to the circuit equipment grounding conductor , a separate equipment grounding conductor of the wire-type shall be installed in the raceway in accordance with 250 .118.

Statement of Problem and Substantiation for Public Input

No. 1. According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about 'Grounding.'
No. 2 Text revised to make it clear that we the rule is about the connection to the equipment grounding conductor, not 'ground.'

Submitter Information Verification

Submitter Full Name:	Mike Holt
Organization:	Mike Holt Enterprises Inc
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Mon Jun 01 17:02:26 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle to the title. The submitter's Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. The Section is in place to address any grounding or bonding requirements. Also, 250.118 was not referenced since it does not have installation requirements for wire type equipment grounding conductors in Surface Nonmetallic Raceways.

Public Input No. 2947-NFPA 70-2020 [Section No. 390.2]

~~**390.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

~~**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.~~

Statement of Problem and Substantiation for Public Input

The definition for Underfloor Raceway was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2891-NFPA 70-2020 [New Definition after Definition: Raceway.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 13:28:47 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3589-NFPA 70-2020 [Section No. 390.2]

(Relocate all definitions in the 390.2 to Article 100, arrange them in alphabetical order and without any subdivisions)

390. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

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.

Statement of Problem and Substantiation for Public Input

"The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100. "

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 08:25:24 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 2948-NFPA 70-2020 [Section No. 392.2]

~~**392.2** Definition.~~

~~The definition in this section shall apply within this article and throughout the *Code* .~~

~~**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.~~

Statement of Problem and Substantiation for Public Input

The definition for Cable Tray was deleted and relocated to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2896-NFPA 70-2020 [New Definition after Definition: Cable Routing Assembly.]	

Submitter Information Verification

Submitter Full Name: David Kendall
Organization: ABB Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 03 13:30:27 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 3590-NFPA 70-2020 [Section No. 392.2]

(Relocate all definitions in the 392.2 to Article 100, arrange them in alphabetical order and without any subdivisions.)

392. 2 Definition.

The definition in this section shall apply within this article and throughout the *Code*.

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.

Statement of Problem and Substantiation for Public Input

"The National Electrical Code has definitions in multiple parts in Article 100 and many definitions scattered through out the code many of them in the .2 section of the articles.
Most of the other standards under NFPA have their definitions in one location and this will allow the NEC the same requirement. The revisions to the NEC Style Manual require all the definitions to be relocated to Article 100. "

Submitter Information Verification

Submitter Full Name: David Williams

Organization: Delta Charter Township

Street Address:

City:

State:

Zip:

Submittal Date: Wed Sep 09 08:26:56 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 192-NFPA 70-2019 [Section No. 392.10(A)]

(A) Wiring Methods.

The wiring methods in Table 392.10(A) shall be permitted to be installed in cable tray systems under the conditions described in their respective articles and sections.

Table 392.10(A) Wiring Methods

Wiring Method	Article
Armored cable: Type AC	320
CATV cables	800 & 820
Class 2 and Class 3 cables	725
Communications cables	800 & 805
Communications raceways	~~725, 770, and~~ 800
Electrical metallic tubing: Type EMT	358
Electrical nonmetallic tubing: Type ENT	362
Fire alarm cables	760
Flexible metal conduit: Type FMC	348
Flexible metallic tubing: Type FMT	360
Instrumentation tray cable: Type ITC	727
Intermediate metal conduit: Type IMC	342
Liquidtight flexible metal conduit: Type LFMC	350
Liquidtight flexible nonmetallic conduit: Type LFNC	356
Metal-clad cable: Type MC	330
Mineral-insulated, metal-sheathed cable: Type MI	332
Network-powered broadband communications cables	800 & 830
Nonmetallic-sheathed cable: Types NM, NMC, and NMS	334
Non–power-limited fire alarm cable	760
Optical fiber cables	770
Other factory-assembled, multiconductor control, signal, or power cables that are specifically approved for installation in cable trays	-
Power and control tray cable: Type TC	336
Power-limited fire alarm cable	760
Power-limited tray cable	725
Rigid metal conduit: Type RMC	344
Rigid polyvinyl chloride conduit: Type PVC	352
Reinforced thermosetting resin conduit: Type RTRC	355
Service-entrance cable: Types SE and USE	338
Underground feeder and branch-circuit cable: Type UF	340

Statement of Problem and Substantiation for Public Input

The 2020 NEC introduced Article 800, General Requirements for Communications Systems. This PI corrects apparent omissions by adding references to Article 800 and 805 (formerly 800).

Submitter Information Verification

Submitter Full Name: Stanley Kaufman
Organization: CableSafe, Inc./OFS
Affiliation: PLASTICS Industry Association (PLASTICS)
Street Address:
City:
State:
Zip:
Submittal Date: Fri Dec 20 09:52:04 EST 2019
Committee: NEC-P08

Committee Statement

Resolution: FR-7574-NFPA 70-2020
Statement: Table 392.10(A) was revised to correlate with the Article 800 and 805.

Instrumentation tray cable: Type ITC was revised from 727 to 341 per the Task Groups recommendation. Note to the Correlating Committee: This revision needs to be confirmed that Article 727 was relocated to Article 341

Public Input No. 2754-NFPA 70-2020 [Section No. 392.10(A)]

(A) Wiring Methods.

The wiring methods in Table 392.10(A) shall be permitted to be installed in cable tray systems under the conditions described in their respective articles and sections.

Table 392.10(A) Wiring Methods

Wiring Method	Article
Armored cable: Type AC	320
CATV cables	820
Class 2 and Class 3 cables	725
Communications cables	800
Communications raceways	725, 770, and 800
Electrical metallic tubing: Type EMT	358
Electrical nonmetallic tubing: Type ENT	362
Fire alarm cables	760
Flexible metal conduit: Type FMC	348
Flexible metallic tubing: Type FMT	360
Instrumentation tray cable: Type ITC	~~727~~ 341
Intermediate metal conduit: Type IMC	342
Liquidtight flexible metal conduit: Type LFMC	350
Liquidtight flexible nonmetallic conduit: Type LFNC	356
Metal-clad cable: Type MC	330
Mineral-insulated, metal-sheathed cable: Type MI	332
Network-powered broadband communications cables	830
Nonmetallic-sheathed cable: Types NM, NMC, and NMS	334
Non–power-limited fire alarm cable	760
Optical fiber cables	770
Other factory-assembled, multiconductor control, signal, or power cables that are specifically approved for installation in cable trays	-
Power and control tray cable: Type TC	336
Power-limited fire alarm cable	760
Power-limited tray cable	725
Rigid metal conduit: Type RMC	344
Rigid polyvinyl chloride conduit: Type PVC	352
Reinforced thermosetting resin conduit: Type RTRC	355
Service-entrance cable: Types SE and USE	338
Underground feeder and branch-circuit cable: Type UF	340

Statement of Problem and Substantiation for Public Input

This Public Comment is submitted on behalf of a task group appointed by the Chairs of NEC® CMP-3

& CMP-6. This Task Group was appointed to review whether NEC® Article 727 should be relocated to Chapter 3 where it was originally proposed. Task Group members are Dennis Nielsen, George Zimmerman, Jerry Kent, Ron Tellas, Kelly Lamp and Keith Waters.

Task Group members noted that ITC tray cable was originally accepted by CMP-6 for Chapter 3, however, the correlating committee at the time chose to have it put in Chapter 7. This Task Group's work confirmed that the material should be moved, but changes needed to be made to meet the chapter 3 style manual requirements. This requested change is proposed in PI 2696.

Since the task group is recommending a relocation of Article 727 to Article 341, table 392.10A needs to be revised to make this change.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2696-NFPA 70-2020 [Article 727]	PI that creates the need for this change

Submitter Information Verification

Submitter Full Name: Keith Waters
Organization: Schneider Electric
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 31 08:57:23 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7574-NFPA 70-2020

Statement: Table 392.10(A) was revised to correlate with the Article 800 and 805.

Instrumentation tray cable: Type ITC was revised from 727 to 341 per the Task Groups recommendation. Note to the Correlating Committee: This revision needs to be confirmed that Article 727 was relocated to Article 341

Public Input No. 589-NFPA 70-2020 [Section No. 392.10(B)(1)]

(1) Single-Conductor Cables and Single Insulated Conductors .

Single-conductor cables and Single insulated conductors shall be permitted to be installed in accordance with (B)(1)(a) through (B)(1)(c).

(a) Single-conductor cables and Single insulated conductors shall be 1/0 AWG or larger and shall be of a type listed and marked on the surface for use in cable trays. Where 1/0 AWG through 4/0 AWG single-conductor cables ~~are~~ and single insulated conductor are installed in ladder cable tray, the maximum allowable rung spacing for the ladder cable tray shall be 225 mm (9 in.).

(b) Welding cables shall comply with Article 630, Part IV.

(c) Single conductors used as equipment grounding conductors shall be insulated, covered, or bare, and they shall be 4 AWG or larger.

Statement of Problem and Substantiation for Public Input

Greetings Code Making Panel,

This change is recommended to bring in alignment with the changes that took place to Section 392.10- Uses Permitted in the 2020 NEC Revision Cycle. With the new statements that permit single insulated conductors 1/0 and Larger in cable trays like their close but different cousins Single Conductor Cable. While many folks believe they are the same they are not. So enlight of the changes in the 2020 NEC to permit something many have been already doing for decades (that's permitting conductors 1/0 and Larger in Cable Trays) this move aligns with the statements in 392.10.

Submitter Information Verification

Submitter Full Name: Paul Abernathy

Organization: Electrical Code Academy, Inc. and ElectricianLIVE.com

Street Address:

City:

State:

Zip:

Submittal Date: Mon Mar 02 17:24:44 EST 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7575-NFPA 70-2020

Statement: Single insulated conductors were added to 392.10(B)(1) to correlate with 392.10.

Public Input No. 4063-NFPA 70-2020 [Section No. 392.18(D)]

(D) Through Partitions and Walls.

Cable trays shall be permitted to extend transversely through partitions and walls or vertically through platforms and floors in wet or dry locations where the installations, complete with installed cables, are made in accordance with ~~the requirements of~~ 300.21.

Statement of Problem and Substantiation for Public Input

Deleting the words "the requirements of" does not change the meaning of the section.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:

Submittal Date: Wed Sep 09 19:42:08 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7576-NFPA 70-2020

Statement: Section 392.18(D) was revised to remove “the requirements of” for usability and clarity.

Public Input No. 2784-NFPA 70-2020 [Section No. 392.18(F)]

(F) Adequate Access.

Sufficient space, a minimum of 300mm (12 in.) access headroom shall be provided and maintained about cable trays to permit adequate access for installing and maintaining the cables. Care shall be taken to ensure that other building components (e.g., air conditioning ducts) do not restrict access to trays or wireways.

Statement of Problem and Substantiation for Public Input

To comply with NEC Style Manual Table 3.2.1 Possibly Unenforceable and Vague Terms: Adequate, Sufficient. This defines the space allowing for the usage of the words.
This is to correlate with ANSI/TIA/EIA – 569 – C SECTION 9.6.3.1

Submitter Information Verification

Submitter Full Name:	Richard Hollander
Organization:	Shums Coda Associates
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Mon Aug 31 21:01:31 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: Section 392.18(F) focus is for adequate spacing three dimensionally around the cable tray and not just above it to solve safe access needs for personnel safety and cable installations.

Public Input No. 1109-NFPA 70-2020 [Section No. 392.18(G)]

(G) Raceways, Cables, Boxes, and Conduit Bodies Supported from Cable Tray Systems.

~~In~~ At industrial facilities where conditions of maintenance and supervision ensure that only qualified persons service the installation and where the cable tray systems are designed and installed to support the load, such systems shall be permitted to support raceways and cables, and boxes and conduit bodies covered in 314.1. For raceways terminating at the tray, a listed cable tray clamp or adapter shall be used to securely fasten the raceway to the cable tray system. Additional supporting and securing of the raceway shall be in accordance with the requirements of the appropriate raceway article. For raceways or cables running parallel to and attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance with the requirements of the appropriate raceway or cable article.

For boxes and conduit bodies attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance with the requirements of 314.23.

Statement of Problem and Substantiation for Public Input

'At' is the better preposition to use here rather than 'in. Cable tray is installed both indoors and outdoors.

Submitter Information Verification

Submitter Full Name: Norman Feck

Organization: State of Colorado

Street Address:

City:

State:

Zip:

Submittal Date: Sat May 16 16:19:03 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: “In” is appropriate for 392.18(G) and used elsewhere in the Code for “industrial facilities”. See 501.10(B)(1)(9).

Public Input No. 4065-NFPA 70-2020 [Section No. 392.18(G)]

(G) Raceways, Cables, Boxes, and Conduit Bodies Supported from Cable Tray Systems.

In industrial facilities where conditions of maintenance and supervision ensure that only qualified persons service the installation and where the cable tray systems are designed and installed to support the load, such systems shall be permitted to support raceways and cables, and boxes and conduit bodies covered in 314.1. For raceways terminating at the tray, a listed cable tray clamp or adapter shall be used to securely fasten the raceway to the cable tray system. Additional supporting and securing of the raceway shall be in accordance ~~with the requirements of the~~ with the appropriate raceway article. For raceways or cables running parallel to and attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance ~~with the requirements of the~~ with the appropriate raceway or cable article.

For boxes and conduit bodies attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance ~~with the requirements of~~ with 314.23.

Statement of Problem and Substantiation for Public Input

Deleting the words "the requirements of" does not change the meaning of the section.
Three Locations

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 19:43:56 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7577-NFPA 70-2020
Statement: Section 392.18(G) was revised to remove “the requirements of” for usability and clarity.

Public Input No. 1110-NFPA 70-2020 [Section No. 392.18(H)]

(H) Marking.

Cable trays containing conductors operating over 600 volts shall have a permanent, legible warning notice carrying the wording “DANGER — HIGH VOLTAGE — KEEP AWAY” placed in a readily visible position on all cable trays, with the spacing of warning notices not to exceed 3 m (10 ft). The danger marking(s) or labels shall comply with 110.21(B).

Exception: Where not accessible (as applied to equipment), ~~in industrial~~ <u>at industrial</u> establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation, cable tray system warning notices shall be located where necessary for the installation to ensure safe maintenance and operation.

Statement of Problem and Substantiation for Public Input

'At' is the better preposition to use here rather than the existing 'in'. Cable tray is installed both indoors and outdoors.

Submitter Information Verification

Submitter Full Name:	Norman Feck
Organization:	State of Colorado
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Sat May 16 16:26:21 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: “In” is appropriate for 392.18(H) and used elsewhere in the Code for “industrial facilities”. See 501.10(B)(1)(9).

Public Input No. 4111-NFPA 70-2020 [New Section after 392.20(C)]

TITLE OF NEW CONTENT

The securing means shall be suitable for the maximum available fault-current that is possible for the circuit.

Additional Proposed Changes

File Name	Description	Approved
Public_Input_4111_-NFPA-70-2020_1.jpg	Figure-1 to accompany Public Input 4111	

Statement of Problem and Substantiation for Public Input

i. The Code requirement for securely binding conductors is subjective and has led to installers using unsuitable products. There have been many instances of cable restraint failures where conductors were carrying short circuit current. In the worst cases, installers have used wire management devices that are only tested by the manufacturer under static conditions and not tested with cables under dynamic fault-current conditions. As such, these devices are not suitable for binding conductors that may be subject to fault-current magnetic forces.

ii. Please refer to Figure-1 for an example of multiple cable restraint failures resulting in loose (under-restrained) cables in a vertical cable tray. Hard copies will be transmitted to NFPA.

iii. These all-to-common instances of cable restraint failures suggest the NEC could benefit from providing additional value by enhancing the performance criteria for parallel conductor restraint. The proposed modification provides an objective and enforceable requirement that would facilitate safer installations. Since many domestic and foreign manufacturers are now testing their cable restraint products to IEC 61914 (Cable cleats for electrical installations), there is ready availability of products, engineering technical support and test reports that are suitable for securing and restraining parallel conductors that may be subject to fault-current magnetic forces. I will be pleased to provide example copies of such test reports upon request.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4143-NFPA 70-2020 [New Section after 392.20(C)]	

Submitter Information Verification

Submitter Full Name: Chaz Darn
Organization: Talon Products, LLC
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 09 21:04:18 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: The submitter's Public Input has not provided a technical substantiation and requirements to add additional securement requirements for maximum available fault-current. In addition, securing and support is addressed in 392.30. Cable securement is determined during the engineering design of the system.

Public Input No. 4143-NFPA 70-2020 [New Section after 392.20(C)]

TITLE OF NEW CONTENT

Informational Note: One method of securely binding cables in circuit groups is through the use of suitable cable cleats.

Statement of Problem and Substantiation for Public Input

The Code requirement to securely bind conductors, does not provide adequate guidance for enforcement, which presents an opportunity for subjective interpretation. There are multiple examples of wire management devices (e.g. cable ties, cable straps, P-clips) that have been used unsuccessfully with the intention of satisfying Article 392.8(C). However, there is no peer-reviewed consensus standard for the aforementioned devices that include short circuit testing. Cable cleats are the only cable restraint devices with a peer-reviewed consensus standard, namely IEC 61914, (Cable cleats for electrical installations), that includes a classification for resistance to electromechanical forces based on short circuit testing.

The following standards and recommended practices have been written or modified over the last 5 years to address cable installation practices. The common factor in each of these standards is their stated intention to follow the NEC wiring practices as much as practicable, including securely binding single conductors into circuit groups. Each of these standards also includes a detailed section addressing restraint for single conductor cables where the authors felt the NEC requirements could be enhanced to provide additional safety and security to safeguard persons and property. Each of these standards also include an informational note explaining that suitable cable cleats can satisfy the performance requirements for binding cables in circuit groups.

- IEEE Std. 45.8, Recommended Practice for Electric Installations on Shipboard – Cable Systems
- IEEE Std. 1185, Recommended Practice for Cable Installation in Generating Stations and Industrial Facilities
- IEEE Std. 1242, IEEE Guide for Specifying and Selecting Power, Control, and Special-Purpose Cable for Petroleum and Chemical Plants
- IEEE Std. P2740, Guide for Selection and Installation of Electrical Cables on Oil and Gas Land Drilling Rigs
- API-RP14F & RP14FZ, Design and Installation of Electrical Systems for Offshore Production Platforms

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4111-NFPA 70-2020 [New Section after 392.20(C)]	

Submitter Information Verification

Submitter Full Name: Chaz Darn

Organization: Talon Products

Street Address:

City:

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Submittal Date: Wed Sep 09 21:54:25 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: The submitter's Public Input has not provided a technical substantiation and requirements to add additional securement requirements for maximum available fault-current. In addition, securing and support is addressed in 392.30. Cable securement is determined during the engineering design of the system.

Public Input No. 4395-NFPA 70-2020 [New Section after 392.20(C)]

TITLE OF NEW CONTENT Connected in Trefoil, Triplex, Quad or Quadplex Formation

Type your content here ...

Multi-phase single conductors that are installed together in a trefoil, triplex or quad / quadplex formation, shall be secured together and fixed to the cable support system with a listed cable restraining device, capable of withstanding the maximum potential electromechanical force generated under short circuit fault conditions.

Note; Maximum potential electromechanical force can be approximated as:

$$Ft = \frac{0.17 \times ip^2}{S}$$

where;

- Ft - is the maximum force on the cable (N/m)
- ip – is the peak short circuit current (kA)
- S – is the centre to centre distance between two neighbouring conductors (m)

Statement of Problem and Substantiation for Public Input

392.20 (C) addresses the need to bound cables in circuit groups to prevent excessive movement due to fault-current magnetic forces, but does not give any guidance on how to actually secure the cables effectively, nor does it address cables run in other formations. Electromechanical forces generated under fault conditions, phase to phase or phase to ground, can be extreme in nature, rendering typically used methods, such as cable ties and/or bands, useless against the magnitude of the electromechanical force. This can cause significant damage to equipment and compromise the safety of personnel in the vicinity. Securing cables by a method, such as a cable cleat, that has been tested to withstand such forces will improve the integrity of the installation and significantly reduce risk to personnel. The product test report can then be used by the AHJ in their evaluation that the method chosen by the installer to secure the cables will not lead to a potentially dangerous situation. The use of listed cable cleats also ensures that the correct cable formation is maintained throughout the lineal length of the circuit and where the cable routing changes direction. This minimizes phase current imbalance and voltage drop.

Submitter Information Verification

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Submittal Date:	Thu Sep 10 11:57:29 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: The submitter's Public Input has not provided a technical substantiation and requirements to add additional securement requirements for maximum available fault-current. In addition, securing and support is addressed in 392.30. Cable securement is determined during the engineering design of the system.

Public Input No. 4148-NFPA 70-2020 [Section No. 392.20(C)]

(C) Connected in Parallel.

Where single conductor cables comprising each phase, neutral, or grounded conductor of an alternating-current circuit are connected in parallel as permitted in 310.10(G), the conductors shall be installed in groups consisting of not more than one conductor per phase, neutral, or grounded conductor to prevent current imbalance in the paralleled conductors due to inductive reactance.

Single conductors shall be securely bound in circuit groups to prevent excessive movement due to fault-current magnetic forces unless single conductors are cabled together~~, such as triplexed assemblies~~ .

Statement of Problem and Substantiation for Public Input

It is known that conductors move during short circuit and fault-current conditions, sometimes violently due to fault-current magnetic forces. The severity of the fault-current magnetic forces is a function of the simultaneous current magnitude in each conductor, as well as the center-to-center spacing between the conductors. If a group of conductors in a circuit are bundled such that they are all touching (e.g. trefoil bundles or triplex cable assemblies) or nearly touching (e.g. as they would be inside a multi-core cable), the fault-current magnetic forces in each instance will be the same order of magnitude. Testing has demonstrated that conductor movement of large single conductor power feeders (e.g. 500 kcmil) is not appreciably reduced by plexing the cables together (i.e. continuously transposing the conductors). The amount of conductor displacement during short circuit or fault-current conditions is primarily a function of the conductor length, slack in the circuit, longitudinal thermal expansion of the conductor (i.e. as the conductor heats from operating temperature to short circuit temperature) and the efficacy of the conductor restraint. While cabling the conductors together (e.g. as in a multi-conductor cable with an overall cable jacket) may provide a limited level of lateral conductor restraint to fault-current magnetic forces, it is unreasonable to expect reduced conductor movement by simply plexing the conductors together (i.e. without any additional means of retention). Cabling single conductors together (e.g. a triplex assembly) does not appreciably limit the conductor movement. Unless the conductors are securely bound by a substantially strong overall covering that is inherent in the cable construction or by separate cable restraint devices along the length of the conductors, the movement may be excessive, which increases the hazard exposure to persons and property.

Submitter Information Verification

Submitter Full Name:	Chaz Darn
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Submittal Date:	Wed Sep 09 22:10:49 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: The submitter's Public Input has not provided a technical substantiation demonstrating the removal of triplex assemblies

Public Input No. 4400-NFPA 70-2020 [Section No. 392.20(C)]

(C) Connected in Parallel.

Where single conductor cables comprising each phase, neutral, or grounded conductor of an alternating-current circuit are connected in parallel as permitted in 310.10(G), the conductors shall be installed in groups consisting of not more than one conductor per phase, neutral, or grounded conductor to prevent current imbalance in the paralleled conductors due to inductive reactance.

Single conductors shall be securely ~~bound~~ bound and fixed to the cable support system using a listed cable restraining device, capable of withstanding the maximum potential electromechanical force generated under short circuit fault conditions , in circuit groups to prevent excessive movement due to fault-current magnetic ~~forces unless single conductors are cabled together, such as triplexed assemblies.~~ forces

Statement of Problem and Substantiation for Public Input

392.20 (C) addresses the need to bound cables in circuit groups to prevent excessive movement due to fault-current magnetic forces, but does not give any guidance on how to actually secure the cables effectively and simply Tri-plexing the cables will not provide effective restraint against the electromechanical forces generated under fault conditions. These forces can be extreme in nature, rendering typically used methods, such as cable ties and/or bands, useless against the magnitude of the electromechanical force. This can cause significant damage to equipment and compromise the safety of personnel in the vicinity. Securing cables by a method, such as cable cleat, that has been tested to withstand such forces will improve the integrity of the installation and significantly reduce risk to personnel. The product test report can then be used by the AHJ in their evaluation that the method chosen by the installer to secure the cables will not lead to a potentially dangerous situation.

Submitter Information Verification

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Submittal Date:	Thu Sep 10 12:07:51 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: The submitter’s Public Input has not provided a technical substantiation and requirements to add additional securement requirements for maximum available fault-current. In addition, securing and support is addressed in 392.30. Cable securement is determined during the engineering design of the system.

Public Input No. 1115-NFPA 70-2020 [Section No. 392.22(A)(1)]

(1) Ladder or Ventilated Trough Cable Trays Containing Any Mixture of Cables.

Where ladder or ventilated trough cable trays contain multiconductor power or lighting cables, or any mixture of multiconductor power, lighting, control, and signal cables, the maximum number of cables shall conform to the following:

(a) Where all of the cables are 4/0 AWG or larger, the sum of the diameters of all cables shall not exceed the cable tray width, and the cables shall be installed in a single layer.

(b) Where the cable ampacity is determined according to 392.80(A)(1)(c), the cable tray width shall not be less than the sum of the diameters of the cables and the sum of the required spacing widths between the cables.

(c) Where all of the cables are smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables shall not exceed the maximum allowable cable fill area in Column 1 of Table 392.22(A) for the appropriate cable tray width.

(d) Where 4/0 AWG or larger cables are installed in the same cable tray with cables smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables smaller than 4/0 AWG shall not exceed the maximum allowable fill area resulting from the calculation in Column 2 of Table 392.22(A) for the appropriate cable tray width. The 4/0 AWG and larger cables shall be installed in a single layer, and no other cables shall be placed on them.

Table 392.22(A) Allowable Cable Fill Area for Multiconductor Cables in Ladder, Ventilated Trough, or Solid Bottom Cable Trays for Cables Rated 2000 Volts or Less

Inside Width of Cable Tray		Maximum Allowable Fill Area for Multiconductor Cables							
		Ladder or Ventilated Trough or Wire Mesh Cable Trays, 392.22(A)(1)				Solid Bottom Cable Trays, 392.22(A)(3)			
		Column 1 Applicable for 392.22(A)(1)(b) Only		Column 2[a] Applicable for 392.22(A)(1)(c) Only		Column 3 Applicable for 392.22(A)(3)(b) Only		Column 4[a] Applicable for 392.22(A)(3)(c) Only	
mm	in.	mm^2	in.^{2}	mm^2	in.^{2}	mm^2	in.^{2}	mm^2	in.^{2}
50	2.0	1,500	2.5	1,500 – (30 Sd)[b]	2.5 – (1.2 Sd)[b]	1,200	2.0	1,200 – (25 Sd)[b]	2.0 – Sd[b]
100	4.0	3,000	4.5	3,000 – (30 Sd)[b]	4.5 – (1.2 Sd)	2,300	3.5	2,300 – (25 Sd)	3.5 – Sd
150	6.0	4,500	7.0	4,500 – (30 Sd)[b]	7 – (1.2 Sd)	3,500	5.5	3,500 – (25 Sd)[b]	5.5–Sd
200	8.0	6,000	9.5	6,000 – (30 Sd)[b]	9.5 – (1.2 Sd)	4,500	7.0	4,500 – (25 Sd)	7.0 – Sd
225	9.0	6,800	10.5	6,800 – (30 Sd)	10.5 – (1.2 Sd)	5,100	8.0	5,100 – (25 Sd)	8.0 – Sd
300	12.0	9,000	14.0	9,000 – (30 Sd)	14 – (1.2 Sd)	7,100	11.0	7,100 – (25 Sd)	11.0 – Sd

Inside Width of Cable Tray		Maximum Allowable Fill Area for Multiconductor Cables							
		Ladder or Ventilated Trough or Wire Mesh Cable Trays, 392.22(A)(1)				Solid Bottom Cable Trays, 392.22(A)(3)			
		Column 1 Applicable for 392.22(A)(1)(b) Only		Column 2[a] Applicable for 392.22(A)(1)(c) Only		Column 3 Applicable for 392.22(A)(3)(b) Only		Column 4[a] Applicable for 392.22(A)(3)(c) Only	
mm	in.	mm^2	$in.^2$	mm^2	$in.^2$	mm^2	$in.^2$	mm^2	$in.^2$
400	16.0	12,000	18.5	12,000 – (30 Sd)	18.5 – (1.2 Sd)	9,400	14.5	9,400 – (25 Sd)	14.5 – Sd
450	18.0	13,500	21.0	13,500 – (30 Sd)	21 – (1.2 Sd)	10,600	16.5	10,600 – (25 Sd)	16.5 – Sd
500	20.0	15,000	23.5	15,000 – (30 Sd)	23.5 – (1.2 Sd)	11,800	18.5	11,800 – (25 Sd)	18.5 – Sd
600	24.0	18,000	28.0	18,000 – (30 Sd)	28 – (1.2 Sd)	14,200	22.0	14,200 – (25 Sd)	22.0 – Sd
750	30.0	22,500	35.0	22,500 – (30 Sd)	35 – (1.2 Sd)	17,700	27.5	17,700 – (25 Sd)	27.5 – Sd
900	36.0	27,000	42.0	27,000 – (30 Sd)	42 – (1.2 Sd)	21,300	33.0	21,300 – (25 Sd)	33.0 – Sd

[a]The maximum allowable fill areas in Columns 2 and 4 shall be calculated. For example, the maximum allowable fill in mm^2 for a 150-mm wide cable tray in Column 2 shall be 4500 minus (30 multiplied by Sd) [the maximum allowable fill, in square inches, for a 6-in. wide cable tray in Column 2 shall be 7 minus (1.2 multiplied by Sd)].

[b]The term *Sd* in Columns 2 and 4 is equal to the sum of the diameters, in mm, of all cables 107.2 mm (in inches, of all 4/0 AWG) and larger multiconductor cables in the same cable tray with smaller cables.

Statement of Problem and Substantiation for Public Input

The first sentence in a} allows cables to be spaced adjacently without spacing. The second sentence requires spacing if sized in accordance with 392.80(A)(1)(c). The change provides clarification.

Submitter Information Verification

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Submittal Date: Sun May 17 07:21:36 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: The submitter’s Public Inputs removes “or lighting cable, or any mixture of multiconductor power,” from 392.22(A)(1). This proposed revision does not provide clarity.

Public Input No. 2657-NFPA 70-2020 [Section No. 392.56]

392.56 Cable Splices and **Type MV Cable Joints** .

Cable splices ~~made~~ and type MV cable joints made and insulated by approved methods shall be permitted to be located within a cable tray, provided they are accessible. Splices ~~shall~~ and type MV cable joints shall be permitted to project above the side rails where not subject to physical damage.

Statement of Problem and Substantiation for Public Input

This PI is a companion to PI 2642 for the addition of type MV cable joints and terminations to article 311.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2642-NFPA 70-2020 [Article 311]	Companion
Public Input No. 2642-NFPA 70-2020 [Article 311]	

Submitter Information Verification

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Organization: UL LLC

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Submittal Date: Thu Aug 27 13:18:02 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: FR-7579-NFPA 70-2020

Statement: Type MV Cable Joints was added to 392.56 to correlate with Article 311. Note to the Correlating Committee: This revision needs to be confirmed with Article 311.

Public Input No. 1348-NFPA 70-2020 [Section No. 392.60]

392.60 Use as Equipment Grounding ~~and Bonding~~ Conductor .

(A) Metal Cable Trays.

Metal cable trays shall be permitted to be used as equipment grounding conductors where continuous maintenance and supervision ensure that qualified persons service the installed cable tray system and the cable tray complies with this section. Metal cable trays that support electrical conductors shall be grounded as required for conductor enclosures in accordance with 250.96 and Part IV of Article 250. Metal cable trays containing only non-power conductors shall be electrically continuous through approved connections or the use of a bonding jumper.

Informational Note: Examples of non-power conductors include nonconductive optical fiber cables and Class 2 and Class 3 remote-control, signaling, and power-limited circuits.

(B) Steel or Aluminum Cable Tray Systems.

Steel or aluminum cable tray systems shall be permitted to be used as equipment grounding conductors, provided all the following requirements are met:

(1) The cable tray sections and fittings are identified as an equipment grounding conductor.

(2) The minimum cross-sectional area of cable trays conform to the requirements in Table 392.60(B).

(3) All cable tray sections and fittings are legibly and durably marked to show the cross-sectional area of metal in channel cable trays, or cable trays of one-piece construction, and the total cross-sectional area of both side rails for ladder or trough cable trays.

(4) Cable tray sections, fittings, and connected raceways are bonded in accordance with 250.96, using bolted mechanical connectors or bonding jumpers sized and installed in accordance with 250.102.

Table 392.60(B) Metal Area Requirements for Cable Trays Used as Equipment Grounding Conductor

Maximum Fuse Ampere Rating, Circuit Breaker Ampere Trip Setting, or Circuit Breaker Protective Relay Ampere Trip Setting for Ground-Fault Protection of Any Cable Circuit in the Cable Tray System	Minimum Cross-Sectional Area of Metal*				
	Steel Cable Trays		-	Aluminum Cable Trays	
	mm^2	in.^{2}	-	mm^2	in.^{2}
60	129	0.20	-	129	0.20
100	258	0.40	-	129	0.20
200	451.5	0.70	-	129	0.20
400	645	1.00	-	258	0.40
600	967.5	1.50†	-	258	0.40
1000	—	—	-	387	0.60
1200	—	—	-	645	1.00
1600	—	—	-	967.5	1.50
2000	—	—	-	1290	2.00†

*Total cross-sectional area of both side rails for ladder or trough cable trays; or the minimum cross-sectional area of metal in channel cable trays or cable trays of one-piece construction.

†Steel cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 600 amperes. Aluminum cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 2000 amperes.

(C) Transitions.

Where metal cable tray systems are mechanically discontinuous, as permitted in 392.18(A), a bonding jumper sized in accordance with 250.102 shall connect the two sections of the cable tray, or the cable tray and the raceway or equipment. Bonding shall be in accordance with 250.96.

Statement of Problem and Substantiation for Public Input

According to the NFPA Style Manual, the Section Title needs to reflect the content of the rule. The rule is about the equipment grounding conductor, not about 'Grounding.'

Submitter Information Verification

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Submittal Date: Mon Jun 01 17:04:24 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: CMP-8 maintains its position from the previous cycle. The submitter's Public Input is editorial in nature and has not provided a technical substantiation to change the title of this section. Changing the title does not add clarity. The current title is not in violation of the current NFPA Style Manual nor the 2020 NEC Style Manual. This section does apply to EGC's, to dedicate this section solely to EGC's changes its designed purpose to address all grounding and bonding needs and diminishes its full intent.

Public Input No. 3496-NFPA 70-2020 [Definition: Cell.]

Relocate this definition to Article 100 and revise the definition to coordinate with the Revised NEC Style Manual because the same term is being used in more than one Article.

Cell.

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

Statement of Problem and Substantiation for Public Input

The definition in Article 480 is quite different to the same term used in Articles 372 and 374 and will need to be adjusted for the Style Manual.
The NEC Style Manual revisions in Section 2.2.2 and its subdivisions requires multiple changes to the definitions in Article 100 and all Articles in the NEC including the use of acronyms in Section 3.2.3. Section 2.2.2.4 Terms with Multiple Definitions. Where two or more definitions exist for a term, a task group shall be formed to work on the development of a single acceptable definition. When this cannot be accomplished, another term shall be selected or the term shall be identified in the context of the specific application.

Submitter Information Verification

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Submittal Date: Tue Sep 08 17:33:47 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7501-NFPA 70-2020

Statement: The definitions for Busway, Cable Tray Systems, Cablebus, Cells, Conduit, Gutters, Headers, Raceways, Tubings, and Wireways were reformatted and relocated from their respective Articles to Article 100 per the 2020 NEC Style Manual Section 2.2.2.

The definitions of Cells and Headers for Articles 372 and 374 were combined into a single definition for clarity. (See PI 3574)

The definitions were revised per Section 2.2.2.3 of the 2020 NEC Style Manual and utilized the "base term" when appropriate.

The Informational Note under Busways was deleted to comply with Section 4.1.4 of the 2020 NEC Style Manual. (See PI 3863)

Public Input No. 1249-NFPA 70-2020 [Definition:]

*Where this table is used in conjunction with Tables C.1 through C.13, the conductors installed must be of the compact type.

Statement of Problem and Substantiation for Public Input

Informative Annex C – Conduit and Tubing Fill Tables for Conductors and Fixture Wires of the Same Size

- Add language to the header of each table that values within the table are based on over 2 conductors 40%.
- Suggested additional language shown in bold: (Based on Chapter 9: Table 1, Table 4, and Table 5 for conduit and tubing with over 2 conductors based on a 40% fill ratio.). The NEC has improved significantly in large part due to improved clarity, formatting and readability.

Submitter Information Verification

Submitter Full Name: Gary Hein
Organization: Submission is independent of employer.
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Zip:
Submittal Date: Sat May 23 14:04:36 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: The additional text to the headers does not add clarity and is not necessary, the information is already addressed in Chapter 9 Table 1

Public Input No. 4369-NFPA 70-2020 [Part I.]

Part I. General ~~Requirements~~

Statement of Problem and Substantiation for Public Input

"Article 368 is subdivided into multiple parts and needs to comply with the revised NEC Style Manual on Parts 2.1.4 Part titles shall be descriptive and as concise as possible.
2.4.2.1 ...Where an article has multiple parts, Part I. shall be titled “General”. "

Submitter Information Verification

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Submittal Date: Thu Sep 10 11:24:21 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7611-NFPA 70-2020
Statement: The title of Part I is updated for conciseness and consistency with other parts of this Code.

Public Input No. 4481-NFPA 70-2020 [New Part after II.]

TITLE OF NEW CONTENT

370.6 Listing. Cable bus shall be listed.

Statement of Problem and Substantiation for Public Input

While Article 370 for cable bus has been in the code for many cycles the use was limited in the United States until recently when it is being installed more frequently for high capacity systems needing more flexibility than what might be provided by busduct or conduit and cable. As this product is being applied, many AHJs are having difficulting with being sure the product is constructed and applied correctly. One main point is the ampacities being advertised by the manufacturers. Generally, what is being stated is the ampacity or rating is the free air ampacity from NEC Table 310.17 which may be true to an extent. What is not clear is if this ampacity still applies when the cable bus is terminated at each end into switchboards, switchgear or equipment such as transformer enclosures or generator terminal boxes. This equipment is generally limited to the 75C temperature ampacity from Table 310.16 which can be very different from the ampacity for that conductor in free air found in Table 310.17. Another issue arises for installations where the cable bus itself is not installed with free air around it. A recent installation had parts of the cable bus installed in a trench with a steel cover over the top. This does not seem to meet the definition of "free air", added to the 2020 NEC, for ampacity consideration. Nameplates and other critical markings are needed and need to be visible after installation for the inspector to see. The nameplate is not always readily visible for the inspector to find. The second edition of a product standard, CSA/ANSI C22.2 No. 273:19, is available is is registered as an American National Standard. Just as most other wiring methods are listed, cable bus should be also be required to be listed so the designers, installers, and AHJs can make proper decisions on applications and efficiently approve the installation.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 4598-NFPA 70-2020 [Section No. 250.66]	Revised 250.66
Public Input No. 4631-NFPA 70-2020 [Section No. 250.104(A)]	Water pipe bonding
Public Input No. 4653-NFPA 70-2020 [Section No. 250.104(C)]	Structural metal bonding

Submitter Information Verification

Submitter Full Name: Charles Mello
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Submittal Date: Thu Sep 10 13:52:55 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: The conductors used within a Cablebus assembly are generally listed. While many Cablebus systems are designed for a specific application manufacturers design in accordance with, and many users specify compliance with IEEE C37.23-2015. Listing of Cablebus to ANSI/CSA C22.2 No. 273 is not prohibited by the Code and is done by some manufacturers today. As clarified by the addition of informational notes to 370.20(B) during the last cycle, the requirements of 110.14(C) or 110.40(C) for conductor temperature limitations at terminations do apply. The covered trench installation described in the substantiation does not appear to meet the definition of free air as defined by this Code The issue of nameplate visibility is being addressed.

Public Input No. 2397-NFPA 70-2020 [New Part after III.]

NEUTRAL CONDUCTOR

Neutral bus, where required, shall be sized to carry all neutral load current, including harmonic currents, and shall have adequate momentary and short-circuit current rating consistent with system requirements.

Statement of Problem and Substantiation for Public Input

Neutral conductors can be overloaded by harmonic currents. This change recognizes the potential problem with low-voltage conductors, and makes it consistent with 368.258 and other sections in this Code.

Submitter Information Verification

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Submittal Date: Wed Aug 19 06:59:14 EDT 2020

Committee: NEC-P08

Committee Statement

Resolution: The proposed section will introduce requirements that are difficult to verify without a power study. Neutral sizing is addressed in the product standards used by the manufacturer of the equipment. Neutral sizing is addressed in other areas of this code and is not unique to Article 368.

Public Input No. 1248-NFPA 70-2020 [Section No. Table]

Table 1

Table 1 Percent of Cross Section of Conduit and Tubing for Conductors and Cables

Number of Conductors and/or Cables	Cross-Sectional Area (%)
1	53
2	31
Over 2	40

Informational Note No. 1: Table 1 is based on common conditions of proper cabling and alignment of conductors where the length of the pull and the number of bends are within reasonable limits. It should be recognized that, for certain conditions, a larger size conduit or a lesser conduit fill should be considered.

Informational Note No. 2: When pulling three conductors or cables into a raceway, if the ratio of the raceway (inside diameter) to the conductor or cable (outside diameter) is between 2.8 and 3.2, jamming can occur. While jamming can occur when pulling four or more conductors or cables into a raceway, the probability is very low.

Notes to Tables

(1) See Informative Annex C for the maximum number of conductors and fixture wires, all of the same size (total cross-sectional area including insulation) permitted in trade sizes of the applicable conduit or tubing. Annex C values are based on over 2 conductors 40% from Chapter 9 Table 1.

(2) Table 1 applies only to complete conduit or tubing systems and is not intended to apply to sections of conduit or tubing used to protect exposed wiring and cable from physical damage.

(3) Equipment grounding or bonding conductors, where installed, shall be included when calculating conduit or tubing fill. The actual dimensions of the equipment grounding or bonding conductor (insulated or bare) shall be used in the calculation.

(4) Where conduit or tubing nipples having a maximum length not to exceed 600 mm (24 in.) are installed between boxes, cabinets, and similar enclosures, the nipples shall be permitted to be filled to 60 percent of their total cross-sectional area, and 310.15(C)(1) adjustment factors need not apply to this condition.

(5) For conductors not included in Chapter 9, such as multiconductor cables and optical fiber cables, the actual dimensions shall be used.

(6) For combinations of conductors of different sizes, use actual dimensions or Table 5 and Table 5A for dimensions of conductors and Table 4 for the applicable conduit or tubing dimensions.

(7) When calculating the maximum number of conductors or cables permitted in a conduit or tubing, all of the same size (total cross-sectional area including insulation), the next higher whole number shall be used to determine the maximum number of conductors permitted when the calculation results in a decimal greater than or equal to 0.8. When calculating the size for conduit or tubing permitted for a single conductor, one conductor shall be permitted when the calculation results in a decimal greater than or equal to 0.8.

(8) Where bare conductors are permitted by other sections of this *Code*, the dimensions for bare conductors in Table 8 shall be permitted.

(9) A multiconductor cable, optical fiber cable, or flexible cord of two or more conductors shall be treated as a single conductor for calculating percentage conduit or tubing fill area. For cables that have elliptical cross sections, the cross-sectional area calculation shall be based on using the major diameter of the ellipse as a circle diameter. Assemblies of single insulated conductors without an overall covering shall not be considered a cable when determining conduit or tubing fill area. The conduit or tubing fill for the assemblies shall be calculated based upon the individual conductors.

(10) The values for approximate conductor diameter and area shown in Table 5 are based on worst-case scenario and indicate round concentric-lay-stranded conductors. Solid and round concentric-lay-stranded conductor values are grouped together for the purpose of

Table 5. Round compact-stranded conductor values are shown in Table 5A. If the actual values of the conductor diameter and area are known, they shall be permitted to be used.

Statement of Problem and Substantiation for Public Input

The change will help clarify that Annex C values are based on over 2 conductors 40% from Chapter 9 Table 1.

Submitter Information Verification

Submitter Full Name: Gary Hein
Organization: Submission is independent of employer.
Street Address:
City:
State:
Zip:
Submittal Date: Sat May 23 13:59:08 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: The proposed revision is not a true statement since depending on the size the tables in Annex C may be based on 1 or 2 conductors.

Public Input No. 1915-NFPA 70-2020 [Section No. Table]

Table 1

Table 1 Percent of Cross Section of Conduit and Tubing for Conductors and Cables

Number of Conductors and/or Cables	Cross-Sectional Area (%)
1	53
2	31
Over 2	40

Informational Note No. 1: Table 1 is based on common conditions of proper cabling and alignment of conductors where the length of the pull and the number of bends are within reasonable limits. It should be recognized that, for certain conditions, a larger size conduit or a lesser conduit fill should be considered.

Informational Note No. 2: When pulling three conductors or cables into a raceway, if the ratio of the raceway (inside diameter) to the conductor or cable (outside diameter) is between 2.8 and 3.2, jamming can occur. While jamming can occur when pulling four or more conductors or cables into a raceway, the probability is very low.

Notes to Tables

(1) See Informative Annex C for the maximum number of conductors and fixture wires, all of the same size (total cross-sectional area including insulation) permitted in trade sizes of the applicable conduit or tubing.

(2) Table 1 applies only to complete conduit or tubing systems and is not intended to apply to sections of conduit or tubing used to protect exposed wiring and cable from physical damage.

(3) Equipment grounding or bonding conductors, where installed, shall be included when calculating conduit or tubing fill. The actual dimensions of the equipment grounding or bonding conductor (insulated or bare) shall be used in the calculation.

(4) Where conduit or tubing nipples having a maximum length not to exceed 600 mm (24 in.) are installed between boxes, cabinets, and similar enclosures, the nipples shall be permitted to be filled to 60 percent of their total cross-sectional area, and 310.15(C)(1) adjustment factors need not apply to this condition.

(5) For conductors not included in Chapter 9, such as multiconductor cables and optical fiber cables, the actual dimensions shall be used.

(6) For combinations of conductors of different sizes, use actual dimensions or Table 5 and Table 5A for dimensions of conductors and Table 4 for the applicable conduit or tubing dimensions.

(7) When calculating the maximum number of conductors or cables permitted in a conduit or tubing, all of the same size (total cross-sectional area including insulation), the next higher whole number shall be used to determine the maximum number of conductors permitted when the calculation results in a decimal greater than or equal to 0.8. When calculating the size for conduit or tubing permitted for a single conductor, one conductor shall be permitted when the calculation results in a decimal greater than or equal to 0.8.

(8) Where bare conductors are permitted by other sections of this *Code*, the dimensions for bare conductors in Table 8 shall be permitted.

(9) A multiconductor cable, optical fiber cable, or flexible cord of two or more conductors shall be treated as a single conductor for calculating percentage conduit or tubing fill area. For cables that have elliptical cross sections, the cross-sectional area calculation shall be based on using the major diameter of the ellipse as a circle diameter. Assemblies of single insulated conductors without an overall covering shall not be considered a cable when determining ~~conduit or tubing fill~~ <u>raceway fill</u> area. The conduit or tubing fill for the assemblies shall be calculated based upon the individual conductors.

(10) The values for approximate conductor diameter and area shown in Table 5 are based on worst-case scenario and indicate round concentric-lay-stranded conductors. Solid and round concentric-lay-stranded conductor values are grouped together for the purpose of Table 5. Round compact-stranded conductor values are shown in Table 5A. If the actual

values of the conductor diameter and area are known, they shall be permitted to be used.

Statement of Problem and Substantiation for Public Input

When determining 20% fill in articles 366.22, 376.22, 378.22 for elliptical cables, it is not clear that this is the process when Note 9 says "conduit or tubing" which those articles are not. Possibly a correlating committee could add an informational note or other language to the above articles referencing the applicable Notes to the tables and tables of Ch.9.

Submitter Information Verification

Submitter Full Name: Shawn Weyer
Organization: IBEW
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jul 15 15:15:19 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: “Conduit and tubing fill” is the correct terminology. The proposed revision wants to use “raceway fill” which would include rectangular raceways such as Wireways and Surface Raceways. Chapter 9 Table 1 is based on circular conduits and tubings.

Public Input No. 603-NFPA 70-2020 [Section No. Table]

Table 1

Table 1 Percent of Cross Section of Conduit and Tubing for Conductors and Cables

Number of Conductors and/or Cables	Cross-Sectional Area (%)
1	53
2	31
Over 2	40

Informational Note No. 1: Table 1 is based on common conditions of proper cabling and alignment of conductors where the length of the pull and the number of bends are within reasonable limits. It should be recognized that, for certain conditions, a larger size conduit or a lesser conduit fill should be considered.

Informational Note No. 2: When pulling three conductors or cables into a raceway, if the ratio of the raceway (inside diameter) to the conductor or cable (outside diameter) is between 2.8 and 3.2, jamming can occur. While jamming can occur when pulling four or more conductors or cables into a raceway, the probability is very low.

Notes to Tables

(1) See Informative Annex C for the maximum number of conductors and fixture wires, all of the same size (total cross-sectional area including insulation) permitted in trade sizes of the applicable conduit or tubing.

(2) Table 1 applies only to complete conduit or tubing systems and is not intended to apply to sections of conduit or tubing used to protect exposed wiring and cable from physical damage.

(3) Equipment grounding or bonding conductors, where installed, shall be included when calculating conduit or tubing fill. The actual dimensions of the equipment grounding or bonding conductor (insulated or bare) shall be used in the calculation.

(4) Where conduit or tubing nipples ~~having~~ , not including connectors, having a maximum length not to exceed 600 mm (24 in.) are installed between boxes, cabinets, and similar enclosures, the nipples shall be permitted to be filled to 60 percent of their total cross-sectional area, and 310.15(C)(1) adjustment factors need not apply to this condition.

(5) For conductors not included in Chapter 9, such as multiconductor cables and optical fiber cables, the actual dimensions shall be used.

(6) For combinations of conductors of different sizes, use actual dimensions or Table 5 and Table 5A for dimensions of conductors and Table 4 for the applicable conduit or tubing dimensions.

(7) When calculating the maximum number of conductors or cables permitted in a conduit or tubing, all of the same size (total cross-sectional area including insulation), the next higher whole number shall be used to determine the maximum number of conductors permitted when the calculation results in a decimal greater than or equal to 0.8. When calculating the size for conduit or tubing permitted for a single conductor, one conductor shall be permitted when the calculation results in a decimal greater than or equal to 0.8.

(8) Where bare conductors are permitted by other sections of this *Code*, the dimensions for bare conductors in Table 8 shall be permitted.

(9) A multiconductor cable, optical fiber cable, or flexible cord of two or more conductors shall be treated as a single conductor for calculating percentage conduit or tubing fill area. For cables that have elliptical cross sections, the cross-sectional area calculation shall be based on using the major diameter of the ellipse as a circle diameter. Assemblies of single insulated conductors without an overall covering shall not be considered a cable when determining conduit or tubing fill area. The conduit or tubing fill for the assemblies shall be calculated based upon the individual conductors.

(10) The values for approximate conductor diameter and area shown in Table 5 are based on worst-case scenario and indicate round concentric-lay-stranded conductors. Solid and round concentric-lay-stranded conductor values are grouped together for the purpose of Table 5. Round compact-stranded conductor values are shown in Table 5A. If the actual

values of the conductor diameter and area are known, they shall be permitted to be used.

Statement of Problem and Substantiation for Public Input

This input clarifies that the connectors on the end of raceways such as EMT are not included in the length of a nipple between junction boxes. So 24" of EMT between boxes meets the requirement, in spite of the total length being including fittings being greater than 24".

Submitter Information Verification

Submitter Full Name:	John McCamish
Organization:	NECA IBEW Electrical Training Center
Affiliation:	Self
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Wed Mar 04 16:23:53 EST 2020
Committee:	NEC-P08

Committee Statement

Resolution:	FR-7580-NFPA 70-2020
Statement:	The revision clarifies that the requirement restricts the nipple to 24 inches without connectors.

Public Input No. 2670-NFPA 70-2020 [Section No. Table]

Table 4

Table 4 Dimensions and Percent Area of Conduit and Tubing (Areas of Conduit or Tubing for the Combinations of Wires Permitted in Table 1, Chapter 9)

Article 358 — Electrical Metallic Tubing (EMT)													
Metric Designator	Trade Size	Over 2 Wires 40%		-	60%		-	1 Wire 53%		-	2 W 31		
		mm2	in.2	-	mm2	in.2	-	mm2	in.2	-	mm2		
16	½	78	0.122	-	118	0.182	-	104	0.161	-	61		
21	¾	137	0.213	-	206	0.320	-	182	0.283	-	106		
27	1	222	0.346	-	333	0.519	-	295	0.458	-	172		
35	1¼	387	0.598	-	581	0.897	-	513	0.793	-	300		
41	1½	526	0.814	-	788	1.221	-	696	1.079	-	407		
53	2	866	1.342	-	1299	2.013	-	1147	1.778	-	671		
63	2½	1513	2.343	-	2270	3.515	-	2005	3.105	-	1173		
78	3	2280	3.538	-	3421	5.307	-	3022	4.688	-	1767		
91	3½	2980	4.618	-	4471	6.927	-	3949	6.119	-	2310		
103	4	3808	5.901	-	5712	8.852	-	5046	7.819	-	2951		
129	5	5220	8.085		7830	12.127		6916	10.713		4045	6.266	128.9
155	6	7528	11.663		11292	17.495		9975	15.454		5834	9.039	154.8

Additional Proposed Changes

File Name	Description	Approved
NEC_CHAPTER_9_TABLE_4-_FOR_5_AND_6_INCH_EMT.xlsx	CHAPTER 9 TABLE 4 - ADDITION OF WIRE FILL FOR 5&6 INCH TRADE SIZE EMT	

Statement of Problem and Substantiation for Public Input

The same methods of calculating wire fill given by Chapter 9 Tables 4, C.1,&C.1(A) will also apply to the purposed 5 & 6 EMT trade sizes; the purposed EMT sizes will have the same profile, Outer diameter, and be constructed with the same materials used by the equivalent RMC trade sizes so there is a negligible concern that the thinner wall will impact wire pulling.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2426-NFPA 70-2020 [Section No. 358.20(B)]	ADDITION OF 5&6 INCH EMT TRADE SIZES

Submitter Information Verification

Submitter Full Name: Omar Lopez
Organization: ABB
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 27 18:09:08 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7626-NFPA 70-2020

Statement: New row data was added to Table 4, Chapter 9 to address the new sizes 5 and 6 inch EMT.

Table 4 Dimensions and Percent Area of Conduit and Tubing (Areas of Conduit or Tubing for the Combinations of Wires Permitted in Table 1, Chapter 9

Article 358 — Electrical Metallic Tubing (EMT)

Metric Designator	Trade Size	Over 2 Wires 40% mm2	in.2	60% mm2	in.2	1 Wire 53% mm2	in.2	2 Wires 31% mm2	in.2
16	1⁄2	78	0.122	118	0.182	104	0.161	61	0.094
21	3⁄4	137	0.213	206	0.32	182	0.283	106	0.165
27	1	222	0.346	333	0.519	295	0.458	172	0.268
35	11⁄4	387	0.598	581	0.897	513	0.793	300	0.464
41	11⁄2	526	0.814	788	1.221	696	1.079	407	0.631
53	2	866	1.342	1299	2.013	1147	1.778	671	1.04
63	21⁄2	1513	2.343	2270	3.515	2005	3.105	1173	1.816
78	3	2280	3.538	3421	5.307	3022	4.688	1767	2.742
91	31⁄2	2980	4.618	4471	6.927	3949	6.119	2310	3.579
103	4	3808	5.901	5712	8.852	5046	7.819	2951	4.573
129	5	5720	8.866	8580	13.300	7579	11.748	4433	6.871
155	6	8076	12.519	12115	18.778	10701	16.587	6259	9.702

Inputs

5" OD	5.5
5" Wall	0.09375
6" OD	6.5
6" Wall	0.09375

Trade Size	OD	ID	Wall	
1⁄2	0.706	0.622	0.042	3/64
3⁄4	0.922	0.824	0.049	3/64
1	1.163	1.049	0.057	1/16
11⁄4	1.51	1.380	0.065	1/16
11⁄2	1.74	1.610	0.065	1/16
2	2.197	2.067	0.065	1/16
21⁄2	2.875	2.731	0.072	5/64
3	3.5	3.356	0.072	5/64
31⁄2	4	3.834	0.083	5/64

4	4.5	4.334	0.083	5/64

Table 1 Percent of Cross Section of Conduit and Tubing for Conductors and Cables

Number of Conductors and / or Cables	Cross-Sectional Area (%)
1	53
2	31
Over 2	40

Article 344 — RMC

12	3⁄8	—	—	—	—	—	—	—	—
16	1⁄2	81	0.125	122	0.188	108	0.166	63	0.097
21	3⁄4	141	0.22	212	0.329	187	0.291	109	0.17
27	1	229	0.355	344	0.532	303	0.47	177	0.275
35	11⁄4	394	0.61	591	0.916	522	0.809	305	0.473
41	11⁄2	533	0.829	800	1.243	707	1.098	413	0.642
53	2	879	1.363	1319	2.045	1165	1.806	681	1.056
63	21⁄2	1255	1.946	1882	2.919	1663	2.579	972	1.508
78	3	1936	3	2904	4.499	2565	3.974	1500	2.325
91	31⁄2	2584	4.004	3877	6.006	3424	5.305	2003	3.103
103	4	3326	5.153	4990	7.729	4408	6.828	2578	3.994
129	5	5220	8.085	7830	12.127	6916	10.713	4045	6.266
155	6	7528	11.663	11292	17.495	9975	15.454	5834	9.039

Nominal Internal Diameter		Total Area 100%		ID % larger than RMC
mm	in.	mm2	in.2	
15.8	0.622	196	0.304	-3.2%
20.9	0.824	343	0.533	-2.9%
26.6	1.049	556	0.864	-2.6%
35.1	1.38	968	1.496	-2.0%
40.9	1.61	1314	2.036	-1.7%
52.5	2.067	2165	3.356	-1.5%
69.4	2.731	3783	5.858	20.4%
85.2	3.356	5701	8.846	18.0%
97.4	3.834	7451	11.545	15.3%
110.1	4.334	9521	14.753	14.5%
134.9375	5.3125	14301	22.166	9.7%
160.3375	6.3125	20191	31.296	7.3%

—	—	—	—
16.1	0.632	204	0.314
21.2	0.836	353	0.549
27	1.063	573	0.887
35.4	1.394	984	1.526
41.2	1.624	1333	2.071
52.9	2.083	2198	3.408
63.2	2.489	3137	4.866
78.5	3.09	4840	7.499
90.7	3.57	6461	10.01
102.9	4.05	8316	12.882
128.9	5.073	13050	20.212
154.8	6.093	18821	29.158

Public Input No. 2427-NFPA 70-2020 [Section No. Table]

Table C.1

Table C.1 Maximum Number of Conductors or Fixture Wires in Electrical Metallic Tubing (EMT)

(Based on Chapter 9: Table 1, Table 4, and Table 5)

Type	Conductor Size (AWG/kcmil)	⅜ (12)	½ (16)	¾ (21)	1 (27)	1¼ (35)	1½ (41)	2 (53)	2½ (63)	3 (78)	3½ (91)	4 (103)	5 (129)	6 (155)
CONDUCTORS														
RHH, RHW, RHW-2	14	—	4	7	11	20	27	46	80	120	157	201—	302	427
	12	—	3	6	9	17	23	38	66	100	131	167—	251	354
	10	—	2	5	8	13	18	30	53	81	105	135—	203	286
	8	—	1	2	4	7	9	16	28	42	55	70—	106	150
	6	—	1	1	3	5	8	13	22	34	44	56—	85	120
	4	—	1	1	2	4	6	10	17	26	34	44—	66	
	3	—	1	1	1	4	5	9	15	23	30	38—	58	
	2	—	1	1	1	3	4	7	13	20	26	33—	50	
	1	—	0	1	1	1	3	5	9	13	17	22—	33	
	1/0	—	0	1	1	1	2	4	7	11	15	19—	29	
	2/0	—	0	1	1	1	2	4	6	10	13	17—	25	
	3/0	—	0	0	1	1	1	3	5	8	11	14—	21	
	4/0	—	0	0	1	1	1	3	5	7	9	12—	18	
	250	—	0	0	0	1	1	1	3	5	7	9—	14	
	300	—	0	0	0	1	1	1	3	5	6	8—	12	
	350	—	0	0	0	1	1	1	3	4	6	7—	11	
	400	—	0	0	0	1	1	1	2	4	5	7—	10	
	500	—	0	0	0	0	1	1	2	3	4	6—	8	
	600	—	0	0	0	0	1	1	1	3	4	5—	7	
	700	—	0	0	0	0	0	1	1	2	3	4—	6	
	750	—	0	0	0	0	0	1	1	2	3	4—	6	8
	800	—	0	0	0	0	0	1	1	2	3	4—	6	8
	900	—	0	0	0	0	0	1	1	1	3	3—	5	
	1000	—	0	0	0	0	0	1	1	1	2	3—	5	7
	1250	—	0	0	0	0	0	0	1	1	1	2—	3	
	1500	—	0	0	0	0	0	0	1	1	1	1—	3	4
	1750	—	0	0	0	0	0	0	1	1	1	1—	3	4
	2000	—	0	0	0	0	0	0	1	1	1	1—	2	3
TW, THHW, THW, THW-2	14	—	8	15	25	43	58	96	168	254	332	424—	638	900
	12	—	6	11	19	33	45	74	129	195	255	326—	490	691
	10	—	5	8	14	24	33	55	96	145	190	243—	365	515
	8	—	2	5	8	13	18	30	53	81	105	135—	203	286
RHH*, RHW*, RHW-2*	14	—	6	10	16	28	39	64	112	169	221	282—	424	599

Type	Conductor Size (AWG/kcmil)	Trade Size (Metric Designator)												
		⅜ (12)	½ (16)	¾ (21)	1 (27)	1¼ (35)	1½ (41)	2 (53)	2½ (63)	3 (78)	3½ (91)	4 (103)	5 (129)	6 (155)
	12	—	4	8	13	23	31	51	90	136	177	227—	341	481
	10	—	3	6	10	18	24	40	70	106	138	177—	266	376
	8	—	1	4	6	10	14	24	42	63	83	106—	159	225
TW, THW, THHW, THW-2, RHH*, RHW*, RHW-2*	6	—	1	3	4	8	11	18	32	48	63	81—	122	172
	4	—	1	1	3	6	8	13	24	36	47	60—	91	128
	3	—	1	1	3	5	7	12	20	31	40	52—	78	110
	2	—	1	1	2	4	6	10	17	26	34	44—	66	94
	1	—	1	1	1	3	4	7	12	18	24	31—	46	66
	-	1/0	—	0	1	1	2	3	6	10	16	20	26—	40
	-	2/0	—	0	1	1	1	3	5	9	13	17	22—	33
	-	3/0	—	0	1	1	1	2	4	7	11	15	19—	28
	-	4/0	—	0	0	1	1	1	3	6	9	12	16—	24
	-	250	—	0	0	1	1	1	3	5	7	10	13—	19
	-	300	—	0	0	1	1	1	2	4	6	8	11—	16
	-	350	—	0	0	0	1	1	1	4	6	7	10—	15
	-	400	—	0	0	0	1	1	1	3	5	7	9—	13
	-	500	—	0	0	0	1	1	1	3	4	6	7—	11
	-	600	—	0	0	0	1	1	1	2	3	4	6—	9
	-	700	—	0	0	0	0	1	1	1	3	4	5—	8
	750	—	0	0	0	0	1	1	1	3	4	5—	7	10
	-	800	—	0	0	0	0	1	1	1	3	3	5—	7
	-	900	—	0	0	0	0	0	1	1	2	3	4—	6
	1000	—	0	0	0	0	0	1	1	2	3	4—	6	8
	-	1250	—	0	0	0	0	0	1	1	1	2	3—	4
	-	1500	—	0	0	0	0	0	1	1	1	1	2—	4
	1750	—	0	0	0	0	0	0	1	1	1	2—	3	5
	-	2000	—	0	0	0	0	0	0	1	1	1	1—	3
	14	—	12	22	35	61	84	138	241	364	476	608—	914	1290
THHN, THWN, THWN-2	12	—	9	16	26	45	61	101	176	266	347	443—	666	941
	10	—	5	10	16	28	38	63	111	167	219	279—	420	593
	8	—	3	6	9	16	22	36	64	96	126	161—	242	342
	6	—	2	4	7	12	16	26	46	69	91	116—	175	247
	-	4	—	1	2	4	7	10	16	28	43	56	71—	107
	-	3	—	1	1	3	6	8	13	24	36	47	60—	91
	-	2	—	1	1	3	5	7	11	20	30	40	51—	76
	-	1	—	1	1	1	4	5	8	15	22	29	37—	56
	-	1/0	—	1	1	1	3	4	7	12	19	25	32—	47
	-	2/0	—	0	1	1	2	3	6	10	16	20	26—	40
	-	3/0	—	0	1	1	1	3	5	8	13	17	22—	33

Type	Conductor Size (AWG/kcmil)	⅜ (12)	½ (16)	¾ (21)	1 (27)	1¼ (35)	1½ (41)	2 (53)	2½ (63)	3 (78)	3½ (91)	4 (103)	5 (129)	6 (155)
	4/0	—	0	1	1	1	2	4	7	11	14	18—	27	
	250	—	0	0	1	1	1	3	6	9	11	15—	22	
	300	—	0	0	1	1	1	3	5	7	10	13—	19	
	350	—	0	0	1	1	1	2	4	6	9	11—	17	
	400	—	0	0	0	1	1	1	4	6	8	10—	15	
	500	—	0	0	0	1	1	1	3	5	6	8—	12	
	600	—	0	0	0	1	1	1	2	4	5	7—	10	
	700	—	0	0	0	1	1	1	2	3	4	6—	9	
	750	—	0	0	0	0	1	1	1	3	4	5—	8	
	800	—	0	0	0	0	1	1	1	3	4	5—	8	11
	900	—	0	0	0	0	1	1	1	3	3	4—	7	
	1000	—	0	0	0	0	1	1	1	2	3	4—	6	9
FEP, FEPB, PFA, PFAH, TFE	14	—	12	21	34	60	81	134	234	354	462	590—	886	1252
	12	—	9	15	25	43	59	98	171	258	337	430—	647	913
	10	—	6	11	18	31	42	70	122	185	241	309—	464	655
	8	—	3	6	10	18	24	40	70	106	138	177—	266	376
	6	—	2	4	7	12	17	28	50	75	98	126—	189	
	4	—	1	3	5	9	12	20	35	53	69	88—	132	
	3	—	1	2	4	7	10	16	29	44	57	73—	110	
	2	—	1	1	3	6	8	13	24	36	47	60—	91	
PFA, PFAH, TFE	1	—	1	1	2	4	6	9	16	25	33	42—	63	89
PFA, PFAH, TFE, Z	1/0	—	1	1	1	3	5	8	14	21	27	35—	53	74
	2/0	—	0	1	1	3	4	6	11	17	22	29—	43	61
	3/0	—	0	1	1	2	3	5	9	14	18	24—	36	51
	4/0	—	0	1	1	1	2	4	8	11	15	19—	29	41
Z	14	—	14	25	41	72	98	161	282	426	556	711—	1068	1508
	12	—	10	18	29	51	69	114	200	302	394	504—	758	
	10	—	6	11	18	31	42	70	122	185	241	309—	464	
	8	—	4	7	11	20	27	44	77	117	153	195—	293	
	6	—	3	5	8	14	19	31	54	82	107	137—	206	
	4	—	1	3	5	9	13	21	37	56	74	94—	142	
	3	—	1	2	4	7	9	15	27	41	54	69—	103	
	2	—	1	1	3	6	8	13	22	34	45	57—	86	
	1	—	1	1	2	4	6	10	18	28	36	46—	70	
XHHW, ZW, XHHW-2, XHH	14	—	8	15	25	43	58	96	168	254	332	424—	638	900
	12	—	6	11	19	33	45	74	129	195	255	326—	490	691
	10	—	5	8	14	24	33	55	96	145	190	243—	365	515
	8	—	2	5	8	13	18	30	53	81	105	135—	203	286

Type	Conductor Size (AWG/kcmil)	Trade Size (Metric Designator) ⅜ (12)	½ (16)	¾ (21)	1 (27)	1¼ (35)	1½ (41)	2 (53)	2½ (63)	3 (78)	3½ (91)	4 (103)	5 (129)	6 (155)
	6	—	1	3	6	10	14	22	39	60	78	100—	150	212
	4	—	1	2	4	7	10	16	28	43	56	72—	109	
	3	—	1	1	3	6	8	14	24	36	48	61—	92	
	2	—	1	1	3	5	7	11	20	31	40	51—	77	
XHHW, XHHW-2, XHH	1	—	1	1	1	4	5	8	15	23	30	38—	57	81
	1/0	—	1	1	1	3	4	7	13	19	25	32—	48	68
	2/0	—	0	1	1	2	3	6	10	16	21	27—	40	57
	3/0	—	0	1	1	1	3	5	9	13	17	22—	33	47
	4/0	—	0	1	1	1	2	4	7	11	14	18—	27	39
	250	—	0	0	1	1	1	3	6	9	12	15—	22	
	300	—	0	0	1	1	1	3	5	8	10	13—	19	
	350	—	0	0	1	1	1	2	4	7	9	11—	17	
	400	—	0	0	0	1	1	1	4	6	8	10—	15	
	500	—	0	0	0	1	1	1	3	5	6	8—	12	
	600	—	0	0	0	1	1	1	2	4	5	6—	10	
	700	—	0	0	0	0	1	1	2	3	4	6—	9	
	750	—	0	0	0	0	1	1	1	3	4	5—	8	
	800	—	0	0	0	0	1	1	1	3	4	5—	8	11
	900	—	0	0	0	0	1	1	1	3	3	4—	7	
	1000	—	0	0	0	0	0	1	1	2	3	4—	6	
	1250	—	0	0	0	0	0	1	1	1	2	3—	5	
	1500	—	0	0	0	0	0	1	1	1	1	3—	4	6
	1750	—	0	0	0	0	0	0	1	1	1	2—	4	
	2000	—	0	0	0	0	0	0	1	1	1	1—	3	
FIXTURE WIRES														
RFH-2, FFH-2, RFHH-2	18	—	8	14	24	41	56	92	161	244	318	407—	611	863
	16	—	7	12	20	34	47	78	136	205	268	343—	515	728
SF-2, SFF-2	18	—	10	18	30	52	71	116	203	307	401	513—	771	1088
	16	—	8	15	25	43	58	96	168	254	332	424—	638	900
	14	—	7	12	20	34	47	78	136	205	268	343—	515	728
SF-1, SFF-1	18	—	18	33	53	92	125	206	360	544	710	908—	1364	1926
RFH-1, TF, TFF, XF, XFF	18	—	14	24	39	68	92	152	266	402	524	670—	1007	1422
	16	—	11	19	31	55	74	123	215	324	423	541—	813	1148
XF, XFF	14	—	8	15	25	43	58	96	168	254	332	424—	638	900
TFN, TFFN	18	—	22	38	63	109	148	244	426	643	839	1073—	1612	2276
	16	—	17	29	48	83	113	186	325	491	641	819—	1231	1738
PF, PFF, PGF,	18	—	21	36	59	103	140	231	404	610	796	1017—	1528	2158

Type	Conductor Size (AWG/kcmil)	Trade Size (Metric Designator) ⅜ (12)	½ (16)	¾ (21)	1 (27)	1¼ (35)	1½ (41)	2 (53)	2½ (63)	3 (78)	3½ (91)	4 (103)	5 (129)	6 (155)
PGFF, PAF, PTF, PTFF, PAFF	16	—	16	28	46	79	108	179	312	471	615	787—	1182	1669
	14	—	12	21	34	60	81	134	234	354	462	590—	886	1252
ZF, ZFF, ZHF	18	—	27	47	77	133	181	298	520	786	1026	1311—	1970	2782
	16	—	20	35	56	98	133	220	384	580	757	967—	1453	2052
	14	—	14	25	41	72	98	161	282	426	556	711—	1068	1508
KF-2, KFF-2	18	—	40	71	115	199	271	447	781	1179	1539	1967—	2955	4173
	16	—	28	49	80	139	189	312	545	823	1074	1372—	2062	2911
	14	—	19	33	54	93	127	209	366	553	721	922—	1385	1956
	12	—	13	23	37	65	88	146	254	384	502	641—	963	1360
	10	—	8	15	25	43	58	96	168	254	332	424—	638	900
KF-1, KFF-1	18	—	46	82	133	230	313	516	901	1361	1776	2269—	3410	4815
	16	—	33	57	93	161	220	363	633	956	1248	1595—	2396	3383
	14	—	22	38	63	109	148	244	426	643	839	1073—	1612	2276
	12	—	14	25	41	72	98	161	282	426	556	711—	1068	1508
	10	—	9	16	27	47	64	105	184	278	363	464—	698	985
XF, XFF	12	—	4	8	13	23	31	51	90	136	177	227—	341	481
		10	—	3	6	10	18	24	40	70	106	138	177—	266

Notes:

1. This table is for concentric stranded conductors only. For compact stranded conductors, Table C.1(A) should be used.

2. Two-hour fire-rated RHH cable has ceramifiable insulation, which has much larger diameters than other RHH wires.

Consult manufacturer's conduit fill tables.

*Types RHH, RHW, and RHW-2 without outer covering.

Additional Proposed Changes

File Name	Description	Approved
NEC_TABLE_C.1_FOR_5_AND_6_INCH_EMT.xlsx	TABLE C.1 WITH THE CALCULATED WIRE FILL FOR 5 & 6 INCH EMT	

Statement of Problem and Substantiation for Public Input

The same methods of calculating wire fill given by Chapter 9 Tables 4, C.1,&C.1(A) will also apply to the purposed 5 & 6 EMT trade sizes; the purposed EMT sizes will have the same profile, Outer diameter, and be constructed with the same materials used by the equivalent RMC trade sizes so there is a negligible concern that the thinner wall will impact wire pulling.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2426-NFPA 70-2020 [Section No. 358.20(B)]	ADDITION OF 5&6 INCH EMT TRADE SIZES

Submitter Information Verification

Submitter Full Name: Omar Lopez
Organization: ABB
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 20 16:05:56 EDT 2020
Committee: NEC-P08

Committee Statement

Resolution: FR-7642-NFPA 70-2020

Statement: New column data was added to Table C.1 of appendix C to address the new sizes 5 and 6 inch EMT.

Table C.1 Maximum Number of Conductors or Fixture Wires in Electrical Metallic Tubing (EMT) (

Type	Conductor Size (AWG/kcmil)	3/8 (12)	1/2 (16)	3/4 (21)	1 (27)	1 1/4 (35)	1 1/2 (41)
						Trade Size (Metric De	
							CONDUCTORS
RHH, RHW, RHW-2	14	—	4	7	11	20	27
	12	—	3	6	9	17	23
	10	—	2	5	8	13	18
	8	—	1	2	4	7	9
	6	—	1	1	3	5	8
	4	—	1	1	2	4	6
	3	—	1	1	1	4	5
	2	—	1	1	1	3	4
	1	—	0	1	1	1	3
	1/0	—	0	1	1	1	2
	2/0	—	0	1	1	1	2
	3/0	—	0	0	1	1	1
	4/0	—	0	0	1	1	1
	250	—	0	0	0	1	1
	300	—	0	0	0	1	1
	350	—	0	0	0	1	1
	400	—	0	0	0	1	1
	500	—	0	0	0	0	1
	600	—	0	0	0	0	1
	700	—	0	0	0	0	0
	750	—	0	0	0	0	0
	800	—	0	0	0	0	0
	900	—	0	0	0	0	0
	1000	—	0	0	0	0	0
	1250	—	0	0	0	0	0
	1500	—	0	0	0	0	0
	1750	—	0	0	0	0	0
	2000	—	0	0	0	0	0
TW,	14	—	8	15	25	43	58
THHW,	12	—	6	11	19	33	45

THW,	10	—	5	8	14	24	33
THW-2	8	—	2	5	8	13	18
	14	—	6	10	16	28	39
RHH*,	12	—	4	8	13	23	31
RHW*,	10	—	3	6	10	18	24
RHW-2*	8	—	1	4	6	10	14
	6	—	1	3	4	8	11
	4	—	1	1	3	6	8
	3	—	1	1	3	5	7
	2	—	1	1	2	4	6
	1	—	1	1	1	3	4
	1/0	—	0	1	1	2	3
	2/0	—	0	1	1	1	3
	3/0	—	0	1	1	1	2
	4/0	—	0	0	1	1	1
	250	—	0	0	1	1	1
	300	—	0	0	1	1	1
	350	—	0	0	0	1	1
	400	—	0	0	0	1	1
	500	—	0	0	0	1	1
	600	—	0	0	0	1	1
	700	—	0	0	0	0	1
	750	—	0	0	0	0	1
	800	—	0	0	0	0	1
TW, THW,	900	—	0	0	0	0	0
THHW,	1000	—	0	0	0	0	0
THW-2,	1250	—	0	0	0	0	0
RHH*,	1500	—	0	0	0	0	0
RHW*,	1750	—	0	0	0	0	0
RHW-2*	2000	—	0	0	0	0	0
	14	—	12	22	35	61	84
	12	—	9	16	26	45	61
	10	—	5	10	16	28	38
	8	—	3	6	9	16	22
	6	—	2	4	7	12	16

	4	—	1	2	4	7	10
	3	—	1	1	3	6	8
	2	—	1	1	3	5	7
	1	—	1	1	1	4	5
	1/0	—	1	1	1	3	4
	2/0	—	0	1	1	2	3
	3/0	—	0	1	1	1	3
	4/0	—	0	1	1	1	2
	250	—	0	0	1	1	1
	300	—	0	0	1	1	1
	350	—	0	0	1	1	1
	400	—	0	0	0	1	1
	500	—	0	0	0	1	1
	600	—	0	0	0	1	1
	700	—	0	0	0	1	1
	750	—	0	0	0	0	1
THHN,	800	—	0	0	0	0	1
THWN,	900	—	0	0	0	0	1
THWN-2	1000	—	0	0	0	0	1
	14	—	12	21	34	60	81
	12	—	9	15	25	43	59
	10	—	6	11	18	31	42
	8	—	3	6	10	18	24
	6	—	2	4	7	12	17
FEP, FEPB,	4	—	1	3	5	9	12
PFA,	3	—	1	2	4	7	10
PFAH, TFE	2	—	1	1	3	6	8
PFA, PFAH,	1	—	1	1	2	4	6
	1/0	—	1	1	1	3	5
PFA,	2/0	—	0	1	1	3	4
PFAH,	3/0	—	0	1	1	2	3
TFE, Z	4/0	—	0	1	1	1	2
	14	—	14	25	41	72	98
	12	—	10	18	29	51	69
	10	—	6	11	18	31	42

	8	—	4	7	11	20	27
	6	—	3	5	8	14	19
	4	—	1	3	5	9	13
	3	—	1	2	4	7	9
	2	—	1	1	3	6	8
z	1	—	1	1	2	4	6
	14	—	8	15	25	43	58
	12	—	6	11	19	33	45
	10	—	5	8	14	24	33
	8	—	2	5	8	13	18
XHHW,	6	—	1	3	6	10	14
ZW,	4	—	1	2	4	7	10
XHHW-2,	3	—	1	1	3	6	8
XHH	2	—	1	1	3	5	7
	1	—	1	1	1	4	5
	1/0	—	1	1	1	3	4
	2/0	—	0	1	1	2	3
	3/0	—	0	1	1	1	3
	4/0	—	0	1	1	1	2
	250	—	0	0	1	1	1
	300	—	0	0	1	1	1
	350	—	0	0	1	1	1
	400	—	0	0	0	1	1
	500	—	0	0	0	1	1
	600	—	0	0	0	1	1
	700	—	0	0	0	0	1
	750	—	0	0	0	0	1
	800	—	0	0	0	0	1
	900	—	0	0	0	0	1
	1000	—	0	0	0	0	0
	1250	—	0	0	0	0	0
XHHW,	1500	—	0	0	0	0	0
XHHW-2,	1750	—	0	0	0	0	0
XHH	2000	—	0	0	0	0	0

FIXTURE WIRES

RFH-2,	18	—	8	14	24	41	56
FFH-2,	16	—	7	12	20	34	47
	18	—	10	18	30	52	71
	16	—	8	15	25	43	58
SF-2, SFF-2	14	—	7	12	20	34	47
SF-1, SFF-1	18	—	18	33	53	92	125
RFH-1, TF,	18	—	14	24	39	68	92
TFF, XF,	16	—	11	19	31	55	74
XF, XFF	14	—	8	15	25	43	58
	18	—	22	38	63	109	148
TFN, TFFN	16	—	17	29	48	83	113
PF, PFF,	18	—	21	36	59	103	140
PGF,	16	—	16	28	46	79	108
PGFF,	14	—	12	21	34	60	81
	18	—	27	47	77	133	181
	16	—	20	35	56	98	133
ZF, ZFF, ZHF	14	—	14	25	41	72	98
	18	—	40	71	115	199	271
	16	—	28	49	80	139	189
	14	—	19	33	54	93	127
	12	—	13	23	37	65	88
KF-2, KFF-2	10	—	8	15	25	43	58
	18	—	46	82	133	230	313
	16	—	33	57	93	161	220
	14	—	22	38	63	109	148
	12	—	14	25	41	72	98
KF-1, KFF-1	10	—	9	16	27	47	64
	12	—	4	8	13	23	31
XF, XFF	10	—	3	6	10	18	24

Based on Chapter 9: Table 1, Table 4, and Table 5)
signator)

2	2 1/2	3	3 1/2	4	5	6
(53)	(63)	(78)	(91)	(103)	(129)	(155)
S						
46	80	120	157	201	302	427
38	66	100	131	167	251	354
30	53	81	105	135	203	286
16	28	42	55	70	106	150
13	22	34	44	56	85	120
10	17	26	34	44	66	94
9	15	23	30	38	58	82
7	13	20	26	33	50	71
5	9	13	17	22	33	47
4	7	11	15	19	29	41
4	6	10	13	17	25	35
3	5	8	11	14	21	30
3	5	7	9	12	18	26
1	3	5	7	9	14	20
1	3	5	6	8	12	17
1	3	4	6	7	11	16
1	2	4	5	7	10	14
1	2	3	4	6	8	12
1	1	3	4	5	7	10
1	1	2	3	4	6	9
1	1	2	3	4	6	8
1	1	2	3	4	6	8
1	1	1	3	3	5	7
1	1	1	2	3	5	7
0	1	1	1	2	3	5
0	1	1	1	1	3	4
0	1	1	1	1	3	4
0	1	1	1	1	2	3
96	168	254	332	424	638	900
74	129	195	255	326	490	691

55	96	145	190	243	365	515
30	53	81	105	135	203	286
64	112	169	221	282	424	599
51	90	136	177	227	341	481
40	70	106	138	177	266	376
24	42	63	83	106	159	225
18	32	48	63	81	122	172
13	24	36	47	60	91	128
12	20	31	40	52	78	110
10	17	26	34	44	66	94
7	12	18	24	31	46	66
6	10	16	20	26	40	56
5	9	13	17	22	33	47
4	7	11	15	19	28	40
3	6	9	12	16	24	33
3	5	7	10	13	19	27
2	4	6	8	11	16	23
1	4	6	7	10	15	21
1	3	5	7	9	13	19
1	3	4	6	7	11	16
1	2	3	4	6	9	13
1	1	3	4	5	8	11
1	1	3	4	5	7	10
1	1	3	3	5	7	10
1	1	2	3	4	6	9
1	1	2	3	4	6	8
1	1	1	2	3	4	6
1	1	1	1	2	4	5
0	1	1	1	2	3	5
0	1	1	1	1	3	4
138	241	364	476	608	914	1290
101	176	266	347	443	666	941
63	111	167	219	279	420	593
36	64	96	126	161	242	342
26	46	69	91	116	175	247

16	28	43	56	71	107	152
13	24	36	47	60	91	128
11	20	30	40	51	76	108
8	15	22	29	37	56	80
7	12	19	25	32	47	67
6	10	16	20	26	40	56
5	8	13	17	22	33	46
4	7	11	14	18	27	38
3	6	9	11	15	22	31
3	5	7	10	13	19	27
2	4	6	9	11	17	24
1	4	6	8	10	15	21
1	3	5	6	8	12	17
1	2	4	5	7	10	14
1	2	3	4	6	9	12
1	1	3	4	5	8	12
1	1	3	4	5	8	11
1	1	3	3	4	7	10
1	1	2	3	4	6	9
134	234	354	462	590	886	1252
98	171	258	337	430	647	913
70	122	185	241	309	464	655
40	70	106	138	177	266	376
28	50	75	98	126	189	267
20	35	53	69	88	132	187
16	29	44	57	73	110	155
13	24	36	47	60	91	128
9	16	25	33	42	63	89
8	14	21	27	35	53	74
6	11	17	22	29	43	61
5	9	14	18	24	36	51
4	8	11	15	19	29	41
161	282	426	556	711	1068	1508
114	200	302	394	504	758	1070
70	122	185	241	309	464	655

44	77	117	153	195	293	414
31	54	82	107	137	206	291
21	37	56	74	94	142	200
15	27	41	54	69	103	146
13	22	34	45	57	86	121
10	18	28	36	46	70	98
96	168	254	332	424	638	900
74	129	195	255	326	490	691
55	96	145	190	243	365	515
30	53	81	105	135	203	286
22	39	60	78	100	150	212
16	28	43	56	72	109	153
14	24	36	48	61	92	130
11	20	31	40	51	77	109
8	15	23	30	38	57	81
7	13	19	25	32	48	68
6	10	16	21	27	40	57
5	9	13	17	22	33	47
4	7	11	14	18	27	39
3	6	9	12	15	22	32
3	5	8	10	13	19	27
2	4	7	9	11	17	24
1	4	6	8	10	15	21
1	3	5	6	8	12	18
1	2	4	5	6	10	14
1	2	3	4	6	9	12
1	1	3	4	5	8	12
1	1	3	4	5	8	11
1	1	3	3	4	7	10
1	1	2	3	4	6	9
1	1	1	2	3	5	7
1	1	1	1	3	4	6
0	1	1	1	2	4	5
0	1	1	1	1	3	5

92	161	244	318	407	611	863
78	136	205	268	343	515	728
116	203	307	401	513	771	1088
96	168	254	332	424	638	900
78	136	205	268	343	515	728
206	360	544	710	908	1364	1926
152	266	402	524	670	1007	1422
123	215	324	423	541	813	1148
96	168	254	332	424	638	900
244	426	643	839	1073	1612	2276
186	325	491	641	819	1231	1738
231	404	610	796	1017	1528	2158
179	312	471	615	787	1182	1669
134	234	354	462	590	886	1252
298	520	786	1026	1311	1970	2782
220	384	580	757	967	1453	2052
161	282	426	556	711	1068	1508
447	781	1179	1539	1967	2955	4173
312	545	823	1074	1372	2062	2911
209	366	553	721	922	1385	1956
146	254	384	502	641	963	1360
96	168	254	332	424	638	900
516	901	1361	1776	2269	3410	4815
363	633	956	1248	1595	2396	3383
244	426	643	839	1073	1612	2276
161	282	426	556	711	1068	1508
105	184	278	363	464	698	985
51	90	136	177	227	341	481
40	70	106	138	177	266	376

Public Input No. 2673-NFPA 70-2020 [Section No. Table]

(A)

Table C.1(A) Maximum Number of Conductors or Fixture Wires in Electrical Metallic Tubing (EMT)

(Based on Chapter 9: Table 1, Table 4, and Table 5A)

Type	Conductor Size (AWG/ kcmil)	⅜ (12)	½ (16)	¾ (21)	1 (27)	1¼ (35)	1½ (41)	2 (53)	2½ (63)	3 (78)	3½ (91)	4 (103)	5 (129)	6 (155)
COMPACT CONDUCTORS														
THW, THW-2, THHW	8	—	2	4	6	11	16	26	46	69	90	115—	174	245
	6	—	1	3	5	9	12	20	35	53	70	89—	134	189
	4	—	1	2	4	6	9	15	26	40	52	67—	100	142
	2	—	1	1	3	5	7	11	19	29	38	49—	74	105
	1	—	1	1	1	3	4	8	13	21	27	34—	52	73
	1/0	—	1	1	1	3	4	7	12	18	23	30—	45	63
	2/0	—	0	1	1	2	3	5	10	15	20	25—	38	53
	3/0	—	0	1	1	1	3	5	8	13	17	21—	32	46
	4/0	—	0	1	1	1	2	4	7	11	14	18—	27	38
	250	—	0	0	1	1	1	3	5	8	11	14—	21	30
	300	—	0	0	1	1	1	3	5	7	9	12—	18	26
	350	—	0	0	1	1	1	2	4	6	8	11—	16	23
	400	—	0	0	0	1	1	1	4	6	8	10—	15	21
	500	—	0	0	0	1	1	1	3	5	6	8—	12	18
	600	—	0	0	0	1	1	1	2	4	5	7—	10	14
	700	—	0	0	0	1	1	1	2	3	4	6—	9	13
	750	—	0	0	0	0	1	1	1	3	4	5—	8	12
	900	—	0	0	0	0	1	1	1	3	4	5—	7	10
	1000	—	0	0	0	0	1	1	1	2	3	4—	7	9
THHN, THWN, THWN-2	8	—	—	—	—	—	—	—	—	—	—	—	—	—
	6	—	2	4	7	13	18	29	52	78	102	130—	196	277
	4	—	1	3	4	8	11	18	32	48	63	81—	121	171
	2	—	1	1	3	6	8	13	23	34	45	58—	87	123
	1	—	1	1	2	4	6	10	17	26	34	43—	65	92
	1/0	—	1	1	1	3	5	8	14	22	29	37—	55	78
	2/0	—	1	1	1	3	4	7	12	18	24	30—	46	65
	3/0	—	0	1	1	2	3	6	10	15	20	25—	38	54
	4/0	—	0	1	1	1	3	5	8	12	16	21—	32	45
	250	—	0	1	1	1	1	4	6	10	13	16—	25	35
	300	—	0	0	1	1	1	3	5	8	11	14—	21	30
	350	—	0	0	1	1	1	3	5	7	10	12—	19	27
	400	—	0	0	1	1	1	2	4	6	9	11—	17	24

Type	Conductor Size (AWG/ kcmil)	⅜ (12)	½ (16)	¾ (21)	1 (27)	1¼ (35)	1½ (41)	2 (53)	2½ (63)	3 (78)	3½ (91)	4 (103)	5 (129)	6 (155)
	500	—	0	0	0	1	1	1	4	5	7	9—	14	20
	600	—	0	0	0	1	1	1	3	4	6	7—	11	16
	700	—	0	0	0	1	1	1	2	4	5	7—	10	14
	750	—	0	0	0	1	1	1	2	4	5	6—	9	13
	900	—	0	0	0	0	1	1	1	3	4	5—	8	11
	1000	—	0	0	0	0	1	1	1	3	3	4—	7	10
XHHW, XHHW-2	8	—	3	5	8	15	20	34	59	90	117	149—	225	317
	6	—	1	4	6	11	15	25	44	66	87	111—	167	236
	4	—	1	3	4	8	11	18	32	48	63	81—	121	171
	2	—	1	1	3	6	8	13	23	34	45	58—	87	123
	1	—	1	1	2	4	6	10	17	26	34	43—	65	92
	1/0	—	1	1	1	3	5	8	14	22	29	37—	55	78
	2/0	—	1	1	1	3	4	7	12	18	24	31—	47	66
	3/0	—	0	1	1	2	3	6	10	15	20	25—	38	54
	4/0	—	0	1	1	1	3	5	8	13	17	21—	32	46
	250	—	0	1	1	1	2	4	7	10	13	17—	26	36
	300	—	0	0	1	1	1	3	6	9	11	14—	22	31
	350	—	0	0	1	1	1	3	5	8	10	13—	19	27
	400	—	0	0	1	1	1	2	4	7	9	11—	17	25
	500	—	0	0	0	1	1	1	4	6	7	9—	14	20
	600	—	0	0	0	1	1	1	3	4	6	8—	11	16
	700	—	0	0	0	1	1	1	2	4	5	7—	10	14
	750	—	0	0	0	1	1	1	2	3	5	6—	9	13
	900	—	0	0	0	0	1	1	1	3	4	5—	8	11
	1000	—	0	0	0	0	1	1	1	3	4	5—	7	10

Definition: *Compact stranding* is the result of a manufacturing process where the stranded conductor is

compressed to the extent that the interstices (voids between strand wires) are virtually eliminated.

Additional Proposed Changes

File Name	Description	Approved
NEC_TABLE_C.1A_FOR_5_AND_6_INCH_EMT.xlsx		

Statement of Problem and Substantiation for Public Input

The same methods of calculating wire fill given by Chapter 9 Tables 4, C.1,&C.1(A) will also apply to the purposed 5 & 6 EMT trade sizes; the purposed EMT sizes will have the same profile, Outer diameter, and be constructed with the same materials used by the equivalent RMC trade sizes so there is a negligible concern that the thinner wall will impact wire pulling.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2426-NFPA 70-2020 [Section No. 358.20(B)]	ADDITION OF 5 & 6 INCH EMT TRADE SIZES

Submitter Information Verification

Submitter Full Name:	Omar Lopez
Organization:	ABB
Street Address:	
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State:	
Zip:	
Submittal Date:	Thu Aug 27 18:34:08 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7643-NFPA 70-2020

Statement: New column data was added to Table C.1(A) of appendix C to address the new sizes 5 and 6 inch EMT.

Table C.1(A) Maximum Number of Conductors or Fixture Wires in Electrical Metallic Tubing (EMT) (Based on Chapter 9: Table 1, Ta

Type	Conductor Size (AWG/kcmil)	3/8 (12)	1/2 (16)	3/4 (21)	1 (27)	1 1/4 (35)	1 1/2 (41)	2 (53)	2 1/2 (63)	3 (78)	3 1/2 (91)
							Trade Size (Metric Designator)				
							COMPACT CONDUCTORS				
	8	—	2	4	6	11	16	26	46	69	90
	6	—	1	3	5	9	12	20	35	53	70
	4	—	1	2	4	6	9	15	26	40	52
	2	—	1	1	3	5	7	11	19	29	38
	1	—	1	1	1	3	4	8	13	21	27
	1/0	—	1	1	1	3	4	7	12	18	23
	2/0	—	0	1	1	2	3	5	10	15	20
	3/0	—	0	1	1	1	3	5	8	13	17
	4/0	—	0	1	1	1	2	4	7	11	14
	250	—	0	0	1	1	1	3	5	8	11
	300	—	0	0	1	1	1	3	5	7	9
	350	—	0	0	1	1	1	2	4	6	8
	400	—	0	0	0	1	1	1	4	6	8
	500	—	0	0	0	1	1	1	3	5	6
	600	—	0	0	0	1	1	1	2	4	5
	700	—	0	0	0	1	1	1	2	3	4
THW,	750	—	0	0	0	0	1	1	1	3	4
THW-2,	900	—	0	0	0	0	1	1	1	3	4
THHW	1000	—	0	0	0	0	1	1	1	2	3
	8	—	—	—	—	—	—	—	—	—	—
	6	—	2	4	7	13	18	29	52	78	102
	4	—	1	3	4	8	11	18	32	48	63
	2	—	1	1	3	6	8	13	23	34	45
	1	—	1	1	2	4	6	10	17	26	34
	1/0	—	1	1	1	3	5	8	14	22	29
	2/0	—	1	1	1	3	4	7	12	18	24
	3/0	—	0	1	1	2	3	6	10	15	20
	4/0	—	0	1	1	1	3	5	8	12	16

	250	—	0	1	1	1	1	4	6	10	13
	300	—	0	0	1	1	1	3	5	8	11
	350	—	0	0	1	1	1	3	5	7	10
	400	—	0	0	1	1	1	2	4	6	9
	500	—	0	0	0	1	1	1	4	5	7
	600	—	0	0	0	1	1	1	3	4	6
	700	—	0	0	0	1	1	1	2	4	5
THHN,	750	—	0	0	0	1	1	1	2	4	5
THWN,	900	—	0	0	0	0	1	1	1	3	4
THWN-2	1000	—	0	0	0	0	1	1	1	3	3
	8	—	3	5	8	15	20	34	59	90	117
	6	—	1	4	6	11	15	25	44	66	87
	4	—	1	3	4	8	11	18	32	48	63
	2	—	1	1	3	6	8	13	23	34	45
	1	—	1	1	2	4	6	10	17	26	34
	1/0	—	1	1	1	3	5	8	14	22	29
	2/0	—	1	1	1	3	4	7	12	18	24
	3/0	—	0	1	1	2	3	6	10	15	20
	4/0	—	0	1	1	1	3	5	8	13	17
	250	—	0	1	1	1	2	4	7	10	13
	300	—	0	0	1	1	1	3	6	9	11
	350	—	0	0	1	1	1	3	5	8	10
	400	—	0	0	1	1	1	2	4	7	9
	500	—	0	0	0	1	1	1	4	6	7
	600	—	0	0	0	1	1	1	3	4	6
	700	—	0	0	0	1	1	1	2	4	5
	750	—	0	0	0	1	1	1	2	3	5
	900	—	0	0	0	0	1	1	1	3	4
IHW, XHHW	1000	—	0	0	0	0	1	1	1	3	4

able 4, and Table 5A

4 (103)	5 (129)	6 (155)
115	174	245
89	134	189
67	100	142
49	74	105
34	52	73
30	45	63
25	38	53
21	32	46
18	27	38
14	21	30
12	18	26
11	16	23
10	15	21
8	12	18
7	10	14
6	9	13
5	8	12
5	7	10
4	7	9
—	—	—
130	196	277
81	121	171
58	87	123
43	65	92
37	55	78
30	46	65
25	38	54
21	32	45

16	25	35
14	21	30
12	19	27
11	17	24
9	14	20
7	11	16
7	10	14
6	9	13
5	8	11
4	7	10
149	225	317
111	167	236
81	121	171
58	87	123
43	65	92
37	55	78
31	47	66
25	38	54
21	32	46
17	26	36
14	22	31
13	19	27
11	17	25
9	14	20
8	11	16
7	10	14
6	9	13
5	8	11
5	7	10

Public Input No. 1284-NFPA 70-2020 [Section No. Table]

Table C.14

Table C.14 Number of Type MC Cables Permitted in Cable Tray (3C Multiconductor MC Cable Non-Jacketed Assembly)

(Based on fill in accordance with 392.~~9~~ 22 , Table 392.~~9~~ 22(A) , column 1, ampacity in accordance with 392.~~11~~ 80)

Conductor Insulation Type		Conductor Size (AWG/kcmil)	Ventilated Tray Width [mm (in.)] 50 (2)	100 (4)	150 (6)	200 (8)	300 (12)	400 (16)	450 (18)	500 (20)	600 (24)	750 (30)	900 (36)	Cable Diameter
THHN	–	–	–	–	–	–	–	–	–	–	–	–	–	
	–	14	13	27	41	55	82	110	124	138	165	206	248	0.4
	–	12	10	20	31	41	62	83	93	104	124	160	192	0.5
	–	10	7	15	23	31	47	62	70	78	94	119	149	0.6
	–	8	6	12	18	25	37	50	56	63	75	96	116	0.6
	–	6	4	8	13	17	26	34	39	43	52	66	79	0.8
	–	4	2	5	8	11	17	23	26	29	35	45	55	0.9
	–	3	2	5	7	10	15	21	23	26	31	40	48	1.0
	–	2	2	4	6	9	13	18	20	22	27	34	41	1.1
	–	1	2	4	6	8	12	16	18	20	24	30	36	1.2
	–	1/0	1	3	5	7	11	14	16	18	22	28	34	1.2
	–	2/0	1	3	4	6	9	13	14	16	19	24	29	1.3
	–	3/0	1	2	3	5	7	10	11	13	15	20	24	1.4
	–	4/0	1	2	3	5	7	10	11	12	15	19	22	1.5
	–	250	1	2	3	4	6	9	10	11	13	17	20	1.7
	–	300	1	2	3	4	6	8	9	10	12	16	19	1.8
	–	350	1	2	3	4	6	8	9	10	12	15	18	1.9
	–	400	0	1	2	3	5	7	8	9	11	14	17	2.1
	–	500	0	1	2	3	5	7	7	8	10	13	16	2.2
	–	600	0	1	2	3	4	6	7	8	9	12	15	2.3
	–	700	0	1	2	3	4	6	7	7	9	11	14	2.5
	–	750	0	1	2	2	4	5	6	7	8	11	13	2.6
	–	800	0	1	2	2	4	5	6	6	8	10	12	2.8
	–	900	0	1	1	2	3	5	5	6	7	10	12	2.9
	–	1000	0	1	1	2	3	4	5	6	7	9	11	3.2

Note: Single conductor diameters were obtained from Chapter 9, Table 5.

Statement of Problem and Substantiation for Public Input

Editorial corrections to section references in the title for Table C.14 in Annex C.

Submitter Information Verification

Submitter Full Name:	Megan Hayes
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Submittal Date:	Thu May 28 11:02:03 EDT 2020
Committee:	NEC-P08

Committee Statement

Resolution: FR-7644-NFPA 70-2020

Statement: The references for Multiconductor MC Cable fill references were corrected to the correct Section and table numbers.