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M E M O R A N D U M

TO: Code-Making Panel 3

FROM: Sarah Caldwell, *Committee Administrator*

DATE: April 15, 2021

SUBJECT: NEC® First Draft Technical Committee FINAL Ballot Results (A22)

According to the final ballot results, all ballot items received the necessary affirmative votes to pass ballot.

22 Members Eligible to Vote
2 Members Not Returned (*Christakos, Sleights*)

The attached report shows the number of affirmative, negative, and abstaining votes as well as the explanation of the vote for **each** revision.

To pass ballot, **each** revision requires: (1) a simple majority of those eligible to vote and (2) an affirmative vote of $\frac{2}{3}$ of ballots returned. See Sections 3.3.4.3.(c) and 4.3.10.1 of the ***Regulations Governing the Development of NFPA Standards***.



First Revision No. 9277-NFPA 70-2021 [Global Input]

Remove "the provisions of" from the language in the following sections to meet Section 4.1.3 of the NEC Style Manual:

Section 300.15(L)

300.20(A)

300.3(B)(1)

300.3(B)(2)

300.20(A)

300.35

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Tue Jan 19 06:49:53 EST 2021

Committee Statement

Committee Statement: CMP3 creates this first revisions to meet the requirements of Section 4.1.3 of the NEC Style Manual.

Response Message: FR-9277-NFPA 70-2021

[Public Input No. 4124-NFPA 70-2020 \[Section No. 300.35\]](#)

[Public Input No. 4120-NFPA 70-2020 \[Section No. 300.3\(B\)\(2\)\]](#)

[Public Input No. 4121-NFPA 70-2020 \[Section No. 300.15\(L\)\]](#)

[Public Input No. 4119-NFPA 70-2020 \[Section No. 300.3\(B\)\(1\)\]](#)

[Public Input No. 4123-NFPA 70-2020 \[Section No. 300.20\(A\)\]](#)

Ballot Results

✓ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.
Burlison, Steven D.
Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9582-NFPA 70-2021 [Global Input]**

New Article 722 Cables for Power-Limited Circuits

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
Article_722_CLEAN_shows_extractions.pdf	This file shows "extractions" of where this language evolved from. Please be aware these are not true "extractions". This file was for my personal notes but thought others could also find this document helpful. For staff use	
Article_722_CLEAN_MOVE_and_Technical_Changes_marked_up.docx	For staff use	
NEC_Global_FR-9582_Article_722_NEW_for_ballot.pdf	For ballot	

Submitter Information Verification**Committee:** NEC-P03**Submittal Date:** Sun Jan 24 19:05:08 EST 2021**Committee Statement**

Committee Statement: This new Article combines common cabling requirements found in Articles 725, 760, and 770 of the 2020 NEC and also relocates other cabling requirements from those articles into a single article. The new article also removes the redundancy between the text-based requirements in 725.135, 760.135 and 770.113, and the tabular requirements in Tables 725.154, 760.154 and 770.154 by including most of the requirements only in tabular form. This has been found to be more user-friendly. Some of the text-based requirements do not lend themselves to being represented in tabular form and remain as text in the new Article. In some cases, such as 725.144, the cable requirements are integrated with equipment requirements and were not moved. In the case of 725.144 a pointer was added in the new article for clarity.

Informational notes were added to provide examples of applicable requirements for the listing of cables. The detailed description of PLTC cable was simplified since PLTC cable constructions are covered in great detail in UL 13, Standard for Power-Limited Circuit Cables.

This new Article significantly improves clarity and usability while removing redundant requirements. It is not the intent of this proposal to introduce any technical changes. Some editorial errors were found during this process and fixed within this public input. If this public input is resolved, there are separate public inputs submitted to fix those issues. Multiple companion public inputs are submitted throughout the NEC as part of this overall effort.

The Panel recommends this new article be numbered after the Class 1,2,3 and 4 articles.

The figure for cable substitutions was not included because the number of cables does not lend itself to a simple drawing.

Table 135(B) replaced all "Y*" with "Y" as there were no "Y" entries and therefore no reason to differentiate with the asterisk.

Response Message: FR-9582-NFPA 70-2021

[Public Input No. 2215-NFPA 70-2020 \[Section No. 725.179\(F\)\]](#)

[Public Input No. 649-NFPA 70-2020 \[Section No. 725.135\(C\)\]](#)

[Public Input No. 2140-NFPA 70-2020 \[Section No. 725.3\(I\)\]](#)

[Public Input No. 4114-NFPA 70-2020 \[Section No. 725.139\(D\)\(1\)\]](#)

[Public Input No. 3671-NFPA 70-2020 \[Global Input\]](#)

[Public Input No. 2437-NFPA 70-2020 \[Section No. 725.179\(A\)\]](#)

[Public Input No. 2142-NFPA 70-2020 \[Section No. 725.154\(B\)\]](#)

[Public Input No. 2436-NFPA 70-2020 \[Section No. 725.154 \[Excluding any Sub-Sections\]\]](#)

[Public Input No. 2435-NFPA 70-2020 \[Section No. 725.135\(H\)\]](#)

[Public Input No. 3993-NFPA 70-2020 \[Global Input\]](#)

[Public Input No. 679-NFPA 70-2020 \[Section No. 725.135\(B\)\]](#)

[Public Input No. 313-NFPA 70-2020 \[Section No. 725.179\]](#)

[Public Input No. 4260-NFPA 70-2020 \[Section No. 725.136\(D\)\]](#)

[Public Input No. 4031-NFPA 70-2020 \[Section No. 725.179\(I\)\]](#)

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

16 Affirmative All

4 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Ivans, Randolph J.

Iverson, Donald R.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Horner, Raymond W.

NEMA supports the addition of Fire-Resistive Cable System but there was not substantiation to keep Electrical Circuit Protective System. When 2-hour fire resistive cables were first introduced into the NEC, UL called these systems "Electrical Circuit Protective System" and they were tested to UL 2196. In 2012, UL withdraw all listed cables under this classification and renamed the new listing cables as a Fire-Resistive Cable System. Electrical Circuit Protective System should be removed from this section of the NEC.

Jones, Chad M.

722.179(A)(9): editorial: extra word "is" in the sentence: "where XAA designates the current is in amperes" should be: "where XAA designates the current in amperes" informational note: parenthesis around 75C need to be deleted. should be exactly as in 725.179 "CL2-LP(0.6A) 75C 23 AWG..."

Jones, Robert A.

CMP 3 members spent a lot of time and effort making changes to all the limited power circuit Articles to ensure the installation requirements were more user friendly and follow a more logical format. The effort of these people will result in better educational material to be developed by curriculum writers and authors of training books. I hope all Chapter 7 Articles under the purview of CMP 3 get the attention of training programs and licensing agencies.

Tellas, Ronald

agreed.

Article 722 Cables for Power-Limited Circuits

Part I. General

722.1 Scope.

This article covers the general requirements for the installation of single- and multiple-conductor cables used in Class 2 and Class 3 power-limited circuits, power-limited fire alarm (PLFA) circuits, and optical fiber installations. Parts I and V of this article provide the general cable requirements for power-limited circuit conductors and cables. Part II covers additional cable requirements specifically for Class 2 and Class 3 circuits. Part III covers additional cable requirements specifically for fire alarm systems. Part IV covers additional cable requirements specifically for optical fiber cables.

722.2 Definitions.

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

Abandoned Cable.

Installed Class 2, Class 3, and PLTC cable that is not terminated at equipment and not identified for future use with a tag.

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

General-purpose cables, cable routing assemblies, and raceways are suitable for general purpose applications and are resistant to the spread of fire.

Cables for Limited Use.

Cables that are intended to be used with protection such as a raceway or for specific restricted applications.

Plenum Cable, Cable Routing Assemblies, and Raceways.

Cables, cable routing assemblies, and raceways that have adequate fire-resistant and low smoke-producing characteristics and are suitable for use in ducts, plenums, and other spaces used for environmental air.

Riser Cable, Cable Routing Assemblies, and Raceways.

Cables, cable routing assemblies, and raceways that have fire-resistant characteristics capable of preventing the carrying of fire from floor to floor and are suitable for use in a vertical run in a shaft or from floor to floor.

Under Carpet Cable.

Cables that are intended to be used under carpeting, floor covering, modular tiles, and planks.

722.3 Other Articles.

In addition to the requirements of this article, installation of cables shall comply with the articles or sections listed in 722.3(A) through (O). Only those sections of Article 300 referenced in this article shall apply.

(A) Installation of Cables and Conductors in Raceway.

The number and size of conductors and cables, as well as raceway sizing, shall comply with 300.17.

(B) Spread of Fire or Products of Combustion.

Installation of power-limited circuits shall comply with 300.21.

(C) Ducts, Plenums, and Other Air-Handling Spaces.

Power-limited circuits installed in ducts, plenums, or other space used for environmental air shall comply with 300.22.

Exception No. 1: Cables selected in accordance with Table 722.154 and installed in accordance with 722.135(B) and 300.22(B), Exception shall be permitted to be installed in ducts specifically fabricated for environmental air.

Exception No. 2: Cables selected in accordance with Table 722.154 and installed in accordance with 722.135(C) shall be permitted to be installed in other spaces used for environmental air (plenums).

(D) Cables in Ducts for Dust, Loose Stock, or Vapor Removal.

Section 300.22(A) for wiring systems shall apply.

Exception: Nonconductive optical fiber cables shall be permitted in ducts used for dust, loose stock, or vapor removal.

(E) Cable Trays.

Cable tray installations shall comply with Parts I and II of Article 392.

(F) Instrumentation Tray Cable.

Circuits wired using instrument tray cable shall comply with 341.1, 341.10, 341.12, 341.24, 341.80, 341.100, and 341.120.

(G) Raceways or Sleeves Exposed to Different Temperatures.

Section 300.7(A) shall apply.

(H) Vertical Support for Fire-Resistive Cables and Conductors.

Vertical installations of circuit integrity (CI) cables and conductors installed in a raceway or conductors and cables of electrical circuit protective systems and fire resistive-cable systems shall be installed in accordance with 300.19.

(I) Installation of Cables with Other Systems.

Section 300.8. shall apply.

(J) Corrosive, Damp, or Wet Locations.

The installation of power-limited cables shall comply with the applicable requirements in sections 110.11, 300.5(B), 300.6, 300.9, and 310.10(F) when installed in corrosive, damp, or wet locations.

(K) Cable Routing Assemblies.

Cables installed in cable routing assemblies shall be selected in accordance with Table 800.154(c), listed in accordance with 800.182, and installed in accordance with 800.110(C)(1), 800.110(C)(2), and 800.113.

(L) Communications Raceways.

Cables communications raceways shall be selected in accordance with Table 800.154(b), listed in accordance with 800.182, and installed in accordance with

800.113 and 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing (ENT) apply.

(M) Temperature Limitation of Class 2 and Class 3 Cables.

The requirements of 310.14(A)(3) on the temperature limitation of conductors shall apply to power-limited circuit cables.

(N) Identification of Equipment Grounding Conductors.

Section 250.119 shall apply.

Exception: Conductors with green insulation shall be permitted to be used as ungrounded signal conductors.

(O) Specific Requirements.

As appropriate, the installation of wires and cables shall also comply with the requirements of the following:

- (1) Class 2 and Class 3 cables — Article 725
- (2) Fire alarm cables — Article 760
- (3) Optical fiber cables — Article 770

722.12 Uses Not Permitted.

Cables shall not be installed in any hazardous (classified) location, except as permitted by other articles of this Code.

Informational Note: See Articles 500 through 516 and Article 517, Part IV for information on hazardous locations.

722.21 Access to Electrical Equipment Behind Panels Designed to Allow Access.

Access to electrical equipment shall not be denied by an accumulation of cables that prevents removal of panels, including suspended ceiling panels.

722.24 Mechanical Execution of Work.

(A) General.

Cables shall be installed in a neat and workmanlike manner. Cables installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be secured by hardware, including straps, staples, hangers, cable ties listed and identified for securement and support, or similar fittings, designed and installed so as not to damage the cable. The installation shall conform to 300.4 and 300.11.

A bushing shall be installed where cables emerge from raceway used for mechanical support or protection in accordance with 300.15(C).

Nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release properties in accordance with 300.22(C).

Informational Note No. 1: See NFPA 90A-2021, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, for discrete combustible components installed in accordance with 300.22(C).

Informational Note No. 2: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants could result in an undetermined alteration of cable properties.

(B) Support of Cables.

Cables shall not be strapped, taped, or attached by any means to the exterior of any conduit or other raceway as a means of support.

Exception No. 1: Class 2 circuit conductors or cables shall be permitted to be installed as permitted by 300.11(C)(2).

Exception No. 2: Overhead (aerial) spans of optical fiber cables shall be permitted to be attached to the exterior of a raceway-type mast intended for the attachment and support of such cables.

(C) Circuit Integrity (CI) Cable.

Circuit integrity (CI) cable shall be supported at a distance not exceeding 610 mm (24 in.). Cable shall be secured to the noncombustible surface of the building structure. Cable supports and fasteners shall be steel.

722.25 Abandoned Cables.

The accessible portion of abandoned cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved.

722.31 Safety-Control Equipment.

Where damage to power-limited circuits can result in a failure of safety-control equipment that would introduce a direct fire or life hazard, the power limited circuits shall be installed using Class 1 circuit wiring methods in accordance with 724.46. All conductors of such circuits shall be installed in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, electrical metallic tubing, Type MI cable, or Type MC cable, or be otherwise suitably protected from physical damage.

722.135 Installation of Cables.

The installation of cables shall comply with 722.135(A) or 722.135(B) or 722.135(C) and 722.135(D) through (G).

(A) Listing.

Cables installed in buildings shall be listed.

(B) Cables in Buildings.

The installation of cables shall comply with Table 722.135(B).

Table 722.135(B) Installation of Listed Cables in Buildings

Applications		Cable Type¹					
		Plenum	Riser	General-Purpose	Limited Use	Under Carpet	PLTC
<u>In ducts specifically fabricated for environmental air as described in 300.22(B)²</u>	<u>Cables in lengths as short as practicable to perform the required function</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>
	<u>In metal raceway that complies with 300.22(B)</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>Y</u>
<u>In other spaces used for environmental air (plenums) as described in 300.22(C)</u>	<u>Cables in other spaces used for environmental air</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>
	<u>Cables in metal raceway that complies with 300.22(C)</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>Y</u>
	<u>Cables in plenum communications raceways</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>
	<u>Cables in plenum cable routing assemblies</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>
	<u>Cables supported by open metal cable trays</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>
	<u>Cables or cables installed in raceways or cable routing assemblies supported by solid bottom metal cable trays with solid metal covers</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>Y</u>
<u>In risers and vertical runs</u>	<u>Cables in vertical runs penetrating one or more floors and in vertical runs in a shaft</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>
	<u>Cables in metal raceways</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>Y</u>
	<u>Cables in fireproof shafts</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>Y</u>
	<u>Cables in plenum communications raceways</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>
	<u>Cables in plenum cable routing assemblies</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>

Applications		Cable Type¹					
		Plenum	Riser	General-Purpose	Limited Use	Under Carpet	PLTC
	<u>Cables in riser communications raceways</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>
	<u>Cables in riser cable routing assemblies</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>
	<u>Cables in one- and two-family dwellings</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y³</u>	<u>N</u>	<u>Y</u>
<u>Cables and innerducts installed in metal raceways in a riser having firestops at each floor²</u>	<u>Cables</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>Y</u>
	<u>Cables in plenum communications raceways (innerduct)</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>Y</u>
	<u>Cables in riser communications raceways (innerduct)</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>Y</u>
	<u>Cables in general purpose communications raceways (innerduct)</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>Y</u>
<u>In fireproof riser shafts having firestops at each floor²</u>	<u>Cables</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>Y</u>
	<u>Cables in plenum communications raceways or plenum cable routing assemblies</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>Y</u>
	<u>Cables in riser communications raceways or riser cable routing assemblies</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>Y</u>
	<u>Cables in general-purpose communications raceways or general-purpose cable routing assemblies</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>Y</u>
	<u>Outdoors</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>Y</u>
<u>In cable trays</u>	<u>Cables, or cables in plenum, riser, or general-purpose communications raceways, installed indoors</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>Y</u>

Applications		Cable Type¹					
		Plenum	Riser	General-Purpose	Limited Use	Under Carpet	PLTC
<u>In cross-connect arrays</u>	<u>Cables, and cables in plenum, riser, or general purpose communications raceways or cable routing assemblies</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>N</u>	<u>Y</u>
<u>In one-, two-, and multifamily dwellings, and in building locations other than the locations covered above</u>	<u>Cables</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y³</u>	<u>N</u>	<u>Y</u>
	<u>Cables in plenum, riser, or general purpose communications raceways or cable routing assemblies, or raceways recognized in Chapter 3</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>Y</u>
	<u>Cables in nonconcealed spaces</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y⁴</u>	<u>Y</u>	<u>Y</u>
	<u>Under carpet, floor covering, modular flooring, and planks</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>Y</u>	<u>N</u>

¹"N" indicates that the cable type shall not be permitted to be installed in the application. "Y" indicates that the cable type shall be permitted to be installed in the application, subject to any limitations described in this article or the articles described in 722.3(O).

²In 300.22(B), cables shall be permitted in ducts specifically fabricated for environmental air only if directly associated with the air distribution system.

³Limited-use cable shall be permitted to be installed only in one-, two-, and multifamily dwellings and only if the cable is smaller in diameter than 6.35 mm (0.25 in.).

⁴The exposed length of cable shall not exceed 3.05 m (10 ft).

Informational Note No. 1: For information on fire protection of wiring installed in ducts specifically fabricated for environmental air and other spaces used for environmental air (plenums), see 4.3.4 and 4.3.11.3.3 of NFPA 90A-2021, *Standard for the Installation of Air-Conditioning and Ventilating Systems*.

Informational Note No. 2: See 300.21 for firestop requirements for floor penetrations.

Informational Note No. 3: See Chapter 3 for the installation requirements for PLTC cables installed outdoors in cable trays.

Informational Note No. 4: See UL 2024, *Standard for Safety for Cable Routing Assemblies and Communications Raceways*, for applicable requirements for plenum, riser, and general purpose cable routing assemblies and raceways.

(C) Industrial Establishments.

In industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation, Type PLTC cable shall be permitted in accordance with either of the following:

- (1) Where the cable is not subject to physical damage, Type PLTC cable that complies with the crush and impact requirements of Type MC cable and is identified as PLTC-ER for such use shall be permitted to be exposed between the cable tray and the utilization equipment or device. The cable shall be continuously supported and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be supported and secured at intervals not exceeding 1.8 m (6 ft). Where not subject to physical damage, Type PLTC-ER cable shall be permitted to transition between cable trays and between cable trays and utilization equipment or devices for a distance not to exceed 1.8 m (6 ft) without continuous support. The cable shall be mechanically supported where exiting the cable tray to ensure that the minimum bending radius is not exceeded.
- (2) Type PLTC cable, with a metallic sheath or armor in accordance with 725.179(E), shall be permitted to be installed exposed. The cable shall be continuously supported and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be secured at intervals not exceeding 1.8 m (6 ft).

(D) In Hoistways.

In hoistways, cables shall be installed in rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, liquidtight flexible nonmetallic conduit, or electrical metallic tubing. For elevators or similar equipment, these conductors shall be permitted to be installed as provided in 620.21.

(E) Cable Substitutions.

The substitutions for cables listed in Table 722.135(E) shall be permitted. Where substitute cables are installed, the installation requirements of the articles described in 722.3(O) shall also apply. CI cables shall be permitted to be installed to provide 2-hour circuit integrity. See 722.154(B).

Informational Note: See 805.179 for information on Types CMP, CMR, CM, and CMX, see 805.179.

Table 722.135(E) Cable Substitutions

<u>Cable Type</u>	<u>Permitted Substitutions</u>
<u>CL3P</u>	<u>CMP</u>
<u>CL2P</u>	<u>CMP, CL3P</u>
<u>CL3R</u>	<u>CMP, CL3P, CMR</u>
<u>CL2R</u>	<u>CMP, CL3P, CL2P, CMR, CL3R</u>
<u>PLTC</u>	<u>None</u>
<u>CL3</u>	<u>CMP, CL3P, CMR, CL3R, CMG, CM, PLTC</u>

<u>Cable Type</u>	<u>Permitted Substitutions</u>
<u>CL2</u>	<u>CMP, CL3P, CL2P, CMR, CL3R, CL2R, CMG, CM, PLTC, CL3</u>
<u>CL3X</u>	<u>CMP, CL3P, CMR, CL3R, CMG, CM, PLTC, CL3, CMX</u>
<u>CL2X</u>	<u>CMP, CL3P, CL2P, CMR, CL3R, CL2R, CMG, CM, PLTC, CL3, CL2, CMX, CL3X</u>
<u>FPLP</u>	<u>CMP</u>
<u>FPLR</u>	<u>CMP, FPLP, CMR</u>
<u>FPL</u>	<u>CMP, FPLP, CMR, FPLR, CMG, CM</u>
<u>OFNP</u>	<u>None</u>
<u>OFCP</u>	<u>OFNP</u>
<u>OFNR</u>	<u>OFNP</u>
<u>OFCR</u>	<u>OFNP, OFCP, OFNR</u>
<u>OFNG, OFN</u>	<u>OFNP, OFNR</u>
<u>OFCG, OFC</u>	<u>OFNP, OFCP, OFNR, OFCR, OFNG, OFN</u>
<u>CMUC</u>	<u>None</u>

(F) Circuit Integrity (CI) Cable, Fire-Resistive Cable System, or Electrical Circuit Protective System.

CI cable, a fire-resistive cable system, or a listed electrical circuit protective system shall be permitted for use in systems that supply critical circuits to ensure survivability for continued circuit operation for a specified time under fire conditions.

(G) Thermocouple Circuits.

Conductors in Type PLTC cables used for Class 2 thermocouple circuits shall be permitted to be any of the materials used for thermocouple extension wire.

Part II. Class 2 and Class 3 Cables

722.140 Wiring Methods and Materials on Load Side of the Class 2 or Class 3 Power Source.

Class 2 and Class 3 circuits on the load side of the power source shall be permitted to be installed using wiring methods and materials in accordance with 722.140(A), (B), or a combination of (A) and (B).

(A) Class 1 Wiring Methods and Materials.

It shall be permitted to use Class 1 wiring methods for Class 2 and Class 3 circuits. Separation from electric light, power, Class 1, non-power-limited fire alarm circuit conductors, and medium-power network-powered broadband communications cables shall comply with 722.141.

Exception: The ampacity adjustment factors given in 310.15(C)(1) shall not apply.

(B) Class 2 and Class 3 Wiring Methods and Materials.

Cables on the load side of the power source shall be insulated in accordance with 722.179 and shall be installed in accordance with 722.135.

Exception No. 1: See 620.21 for wiring methods for elevators and similar equipment.

Exception No. 2: Other wiring methods and materials installed in accordance with 722.3 shall be permitted to extend or replace the conductors and cables described in 722.179 and permitted by 722.140(B).

Exception No. 3: Bare Class 2 conductors shall be permitted as part of a listed intrusion protection system where installed in accordance with the listing instructions for the system.

722.141 Separation from Electric Light, Power, Class 1, Non-Power-Limited Fire Alarm Circuit Conductors, and Medium-Power Network-Powered Broadband Communications Cables.

(A) General.

Cables and conductors of Class 2 and Class 3 circuits shall not be placed in any cable, cable tray, compartment, enclosure, manhole, outlet box, device box, raceway, or similar fitting with conductors of electric light, power, Class 1, non-power-limited fire alarm circuits, and medium-power network-powered broadband communications circuits unless permitted by 722.141(B) through (I).

(B) Separated by Barriers.

Class 2 and Class 3 circuits shall be permitted to be installed together with the conductors of electric light, power, Class 1, non-power-limited fire alarm and medium-power network-powered broadband communications circuits where they are separated by a barrier.

(C) Raceways Within Enclosures.

In enclosures, Class 2 and Class 3 circuits shall be permitted to be installed in a raceway to separate them from Class 1, non-power-limited fire alarm and medium-power network-powered broadband communications circuits.

(D) Associated Systems Within Enclosures.

Class 2 and Class 3 circuit conductors in compartments, enclosures, device boxes, outlet boxes, or similar fittings shall be permitted to be installed with electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits where they are introduced solely to connect the equipment connected to Class 2 and Class 3 circuits, and where one of the following applies:

- (1) The electric light, power, Class 1, non-power-limited fire alarm and medium-power network-powered broadband communications circuit conductors are routed to maintain a minimum of 6 mm (0.25 in.) separation from the conductors and cables of Class 2 and Class 3 circuits.
- (2) The circuit conductors operate at 150 volts or less to ground and comply with one of the following:
 - (a) The Class 2 and Class 3 circuits are installed using Type CL3, CL3R, or CL3P or permitted substitute cables, provided these Class 3 cable conductors extending beyond the jacket are separated by a minimum of 6 mm (0.25 in.) or by a nonconductive

sleeve or nonconductive barrier from all other conductors.

- (b) The Class 2 and Class 3 circuit conductors are installed as a Class 1 circuit in accordance with 725.41.

(E) Enclosures with Single Opening.

Class 2 and Class 3 circuit conductors entering compartments, enclosures, device boxes, outlet boxes, or similar fittings shall be permitted to be installed with Class 1, non-power-limited fire alarm and medium-power network-powered broadband communications circuits where they are introduced solely to connect the equipment connected to Class 2 and Class 3 circuits. Where Class 2 and Class 3 circuit conductors must enter an enclosure that is provided with a single opening, they shall be permitted to enter through a single fitting, such as a tee, provided the conductors are separated from the conductors of the other circuits by a continuous and firmly fixed nonconductor, such as flexible tubing.

(F) Manholes.

Underground Class 2 and Class 3 circuit conductors in a manhole shall be permitted to be installed with Class 1, non-power-limited fire alarm and medium-power network-powered broadband communications circuits where one of the following conditions is met:

- (1) The electric light, power, Class 1, non-power-limited fire alarm and medium-power network-powered broadband communications circuit conductors are in a metal-enclosed cable or Type UF cable.
- (2) The Class 2 and Class 3 circuit conductors are permanently and effectively separated from the conductors of other circuits by a continuous and firmly fixed nonconductor, such as flexible tubing, in addition to the insulation or covering on the wire.
- (3) The Class 2 and Class 3 circuit conductors are permanently and effectively separated from conductors of the other circuits and securely fastened to racks, insulators, or other approved supports.

(G) Cable Trays.

Class 2 and Class 3 circuit conductors shall be permitted to be installed in cable trays, where the conductors of the electric light, Class 1, and non-power-limited fire alarm circuits are separated by a solid fixed barrier of a material compatible with the cable tray or where the Class 2 or Class 3 circuits are installed in Type MC cable.

(H) Where Protected.

Class 2 and Class 3 circuits shall be permitted to be installed together with the conductors of electric light, power, Class 1, non-power-limited fire alarm and medium-power network-powered broadband communications circuits where they are installed using Class 1 wiring methods in accordance with 725.46 and where they are protected by an approved method.

(I) Other Applications.

For other applications, conductors of Class 2 and Class 3 circuits shall be separated by at least 50 mm (2 in.) from conductors of any electric light, power, Class 1 non-power-limited fire alarm or medium-power network-powered broadband communications circuits unless one of the following conditions is met:

- (1) Either all of the electric light, power, Class 1, non-power-limited fire alarm and medium-power network-powered broadband communications circuit conductors or all of the Class 2 and Class 3 circuit conductors are in a raceway or in metal-sheathed, metal-clad, nonmetallic-sheathed, Type TC, or Type UF cables.
- (2) All of the electric light, power, Class 1 non-power-limited fire alarm and medium-power network-powered broadband communications circuit conductors are permanently separated from all of the Class 2 and Class 3 circuit conductors by a continuous and firmly fixed nonconductor, such as porcelain tubes or flexible tubing, in addition to the insulation on the conductors.

722.142 Installation of Conductors of Different Circuits in the Same Cable, Enclosure, Cable Tray, Raceway, or Cable Routing Assembly.

(A) Two or More Class 2 Circuits.

Conductors of two or more Class 2 circuits shall be permitted within the same cable, enclosure, raceway, or cable routing assembly.

(B) Two or More Class 3 Circuits.

Conductors of two or more Class 3 circuits shall be permitted within the same cable, enclosure, raceway, or cable routing assembly.

(C) Class 2 Circuits with Class 3 Circuits.

Conductors of one or more Class 2 circuits shall be permitted within the same cable, enclosure, raceway, or cable routing assembly with conductors of Class 3 circuits, provided that the insulation of the Class 2 circuit conductors in the cable, enclosure, raceway, or cable routing assembly is at least that required for Class 3 circuits.

(D) Class 2 and Class 3 Circuits with Communications Circuits.

(1) Communications Cables.

Conductors of one or more Class 2 or Class 3 circuits shall be permitted in the same cable with conductors of communications circuits if the cable is a listed communications cable installed in accordance with Part V of Article 805. The cables shall be listed as communications cables.

(2) Composite Cables.

Cables constructed of individually listed Class 2, Class 3, and communications cables under a common jacket shall be permitted to be classified as communications cables. The fire resistance rating of the composite cable shall be determined by the performance of the composite cable.

(E) Class 2 or Class 3 Cables with Other Circuit Cables.

Jacketed cables of Class 2 or Class 3 circuits shall be permitted in the same enclosure, cable tray, raceway, or cable routing assembly with jacketed cables of any of the following:

- (1) Power-limited fire alarm systems in compliance with Parts I and III of Article 760
- (2) Nonconductive and conductive optical fiber cables in compliance with Parts I and IV of Article 770

(3) Communications circuits in compliance with Parts I and IV of Article 805

(4) Community antenna television and radio distribution systems in compliance with Parts I and IV of Article 820

(5) Low-power network-powered broadband communications in compliance with Parts I and IV of Article 830

(F) Class 2 or Class 3 Conductors or Cables and Audio System Circuits.

Audio system circuits described in 640.9(C) and installed using Class 2 or Class 3 wiring methods in compliance with 725.133 and 725.154 shall not be permitted to be installed in the same cable, raceway, or cable routing assembly with Class 2 or Class 3 conductors or cables.

722.143 Class 2 and Class 3 Cable Voltage and Temperature Ratings.

Class 2 cables shall have a voltage rating of not less than 150 volts. Class 3 cables shall have a voltage rating of not less than 300 volts. Class 2 and Class 3 cables shall have a temperature rating of not less than 60°C (140°F).

722.144 Bundling of 4-Pair Cables Transmitting Power and Data.

Section 725.144 shall apply to 4-pair cables that are used to transmit power and data to a powered device.

722.145 Installation of Circuit Conductors Extending Beyond One Building.

Where Class 2 or Class 3 circuit conductors extend beyond one building and are run so as to be subject to accidental contact with electric light or power conductors operating over 300 volts to ground, or are exposed to lightning on interbuilding circuits on the same premises, the requirements of the following shall also apply:

- (1) Sections 800.44, 800.53, 800.100, 805.50, 805.93, 805.170(A), and 805.170(B) for other than coaxial conductors
- (2) Sections 820.44, 820.93, and 820.100 for coaxial conductors

Part III. PLFA Cables

722.150 Wiring Methods and Materials on Load Side of the PLFA Power Source.

Fire alarm circuits on the load side of the power source shall be permitted to be installed using wiring methods and materials in accordance with 722.150(A), (B), or a combination of (A) and (B).

(A) NPLFA Wiring Methods and Materials.

It shall be permitted to use NPLFA wiring methods in accordance with 760.46, 760.49, or 760.53 for PLFA circuits. Conductors shall be solid or stranded copper. Separation from electric light, power, Class 1, non-power-limited fire alarm circuit conductors and medium-power network-powered broadband communications cables shall comply with 760.136..

Exception: The ampacity adjustment factors given in 310.15(C)(1) shall not apply.

(B) PLFA Wiring Methods and Materials.

Power-limited fire alarm conductors and cables described in 722.179 shall be installed as detailed in 722.150(B)(1), 722.150(B)(2), or 722.135. Devices shall be installed in accordance with 110.3(B), 300.11(A), and 300.15.

(1) In Raceways, Exposed on Ceilings or Sidewalls, or Fished in Concealed Spaces.

Cable splices or terminations shall be made in listed fittings, boxes, enclosures, fire alarm devices, or utilization equipment. Where installed exposed, cables shall be adequately supported and installed in such a way that maximum protection against physical damage is afforded by building construction such as baseboards, door frames, ledges, and so forth. Where located within 2.1 m (7 ft) of the floor, cables shall be securely fastened in an approved manner at intervals of not more than 450 mm (18 in.).

(2) Passing Through a Floor or Wall.

Cables shall be installed in metal raceways or rigid nonmetallic conduit where passing through a floor or wall to a height of 2.1 m (7 ft) above the floor, unless adequate protection can be afforded by building construction such as detailed in 760.130(B)(1), or unless an equivalent solid guard is provided.

722.151 Separation from Electric Light, Power, Class 1, NPLFA, and Medium-Power Network-Powered Broadband Communications Circuit Conductors.

(A) General.

Power-limited fire alarm circuit cables and conductors shall not be placed in any cable, cable tray, compartment, enclosure, manhole, outlet box, device box, raceway, or similar fitting with conductors of electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits unless permitted by 760.151(B) through (G).

(B) Separated by Barriers.

Power-limited fire alarm circuit cables shall be permitted to be installed together with Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits where they are separated by a barrier.

(C) Raceways Within Enclosures.

In enclosures, power-limited fire alarm circuits shall be permitted to be installed in a raceway within the enclosure to separate them from Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits.

(D) Associated Systems Within Enclosures.

Power-limited fire alarm conductors in compartments, enclosures, device boxes, outlet boxes, or similar fittings shall be permitted to be installed with electric light, power, Class 1, non-power-limited fire alarm and medium-power network-powered broadband communications circuits where they are introduced solely to connect the equipment connected to power-limited fire alarm circuits and comply with either of the following conditions:

- (1) The electric light, power, Class 1, non-power-limited fire alarm and medium-power network-powered broadband communications circuit conductors are routed to maintain a minimum of 6 mm (0.25 in.) separation from the conductors and cables of power-limited fire alarm circuits.
- (2) The circuit conductors operate at 150 volts or less to ground and comply with one of the following:

- (a) The fire alarm power-limited circuits are installed using Type FPL, FPLR, FPLP, or permitted substitute cables, provided these power-limited cable conductors extending beyond the jacket are separated by a minimum of 6 mm (0.25 in.) or by a nonconductive sleeve or nonconductive barrier from all other conductors.
- (b) The power-limited fire alarm circuit conductors are installed as non-power-limited circuits in accordance with 760.46.

(E) Enclosures with Single Opening.

Power-limited fire alarm circuit conductors entering compartments, enclosures, device boxes, outlet boxes, or similar fittings shall be permitted to be installed with electric light, power, Class 1, non-power-limited fire alarm and medium-power network-powered broadband communications circuits where they are introduced solely to connect the equipment connected to power-limited fire alarm circuits or to other circuits controlled by the fire alarm system to which the other conductors in the enclosure are connected. Where power-limited fire alarm circuit conductors must enter an enclosure that is provided with a single opening, they shall be permitted to enter through a single fitting, such as a tee, provided the conductors are separated from the conductors of the other circuits by a continuous and firmly fixed nonconductor, such as flexible tubing.

(F) Where Protected.

PLFA circuits shall be permitted to be installed together with the conductors of electric light, power, Class 1, non-power-limited fire alarm and medium-power network-powered broadband communications circuits where they are installed using NPLFA wiring methods and materials in accordance with Part II of Article 760 and where they are protected by an approved method.

(G) Other Applications.

For other applications, power-limited fire alarm circuit conductors shall be separated by at least 50 mm (2 in.) from conductors of any electric light, power, Class 1, non-power-limited fire alarm or medium-power network-powered broadband communications circuits unless one of the following conditions is met:

- (1) Either (a) all of the electric light, power, Class 1, non-power-limited fire alarm and medium-power network-powered broadband communications circuit conductors or (b) all of the power-limited fire alarm circuit conductors are in a raceway or in metal-sheathed, metal-clad, nonmetallic-sheathed, or Type UF cables.
- (2) All of the electric light, power, Class 1, non-power-limited fire alarm and medium-power network-powered broadband communications circuit conductors are permanently separated from all of the power-limited fire alarm circuit conductors by a continuous and firmly fixed nonconductor, such as porcelain tubes or flexible tubing, in addition to the insulation on the conductors.

722.152 Installation of Conductors of Different PLFA, Class 2, Class 3, and Communications Circuits in the Same Cable, Enclosure, Cable Tray, Raceway, or Cable Routing Assembly.

(A) Two or More PLFA Circuits.

Cable and conductors of two or more power-limited fire alarm circuits shall be permitted within the same cable, enclosure, cable tray, raceway, or cable routing assembly.

(B) Class 2 Circuits with PLFA Circuits.

Conductors of one or more Class 2 circuits shall be permitted within the same cable, enclosure, cable tray, raceway, or cable routing assembly with conductors of power-limited fire alarm circuits, provided that the insulation of the Class 2 circuit conductors in the cable, enclosure, raceway, or cable routing assembly is at least that required by the power-limited fire alarm circuits.

(C) Class 3 and Communication Circuits with PLFA Circuits.

Cable and conductors of Class 3 and communications circuits shall be permitted within the same cable, enclosure, cable tray, raceway, or cable routing assembly with cables and conductors of power-limited fire alarm circuits.

(D) Low-Power Network-Powered Broadband Communications Cables and PLFA Cables.

Low-power network-powered broadband communications circuits shall be permitted in the same enclosure, cable tray, raceway, or cable routing assembly with PLFA cables.

(E) Audio System Circuits and PLFA Circuits.

Audio system circuits described in 640.9(C) and installed using Class 2 or Class 3 wiring methods in compliance with 725.133 and 725.154 shall not be permitted to be installed in the same cable, cable tray, raceway, or cable routing assembly with power-limited conductors or cables.

722.153 Cables.

Cables shall comply with 722.153(A) through (D).

(A) Conductor Materials.

Conductors for cables, other than coaxial cables, shall be solid or stranded copper. Coaxial cables shall be permitted to use 30 percent conductivity copper-covered steel center conductor wire.

(B) Conductor Size.

The size of conductors in a multiconductor cable shall not be smaller than 26 AWG. Single conductors shall not be smaller than 18 AWG. Conductors of 26 AWG shall be permitted only where spliced with a connector listed as suitable for 26 AWG to 24 AWG or larger conductors that are terminated on equipment or where the 26 AWG conductors are terminated on equipment listed as suitable for 26 AWG conductors.

(C) Voltage Ratings.

The cable shall have a voltage rating of not less than 300 volts.

(D) Temperature Ratings.

The cable shall have a temperature rating of not less than 60°C (140°F).

722.154 Installation of PLFA Cables in Buildings.

Installation of power-limited fire alarm cables in buildings shall be in accordance with 722.135 and 722.154 (A) and (B).

(A) Nonconcealed Spaces.

Cables specified in Chapter 3 and meeting the requirements of 760.179(A) and (B) shall be permitted to be installed in nonconcealed spaces where the exposed length of cable does not exceed 3 m (10 ft).

(B) Portable Fire Alarm System.

A portable fire alarm system provided to protect a stage or set when not in use shall be permitted to use wiring methods in accordance with 530.12.

722.155 Fire Alarm Circuits Extending Beyond One Building.

Non-power-limited fire alarm circuits and power-limited fire alarm circuits that extend beyond one building and run outdoors shall meet the installation requirements of Parts II, III, and IV of Article 805 and shall meet the installation requirements of Part I of Article 300.

Part IV. Optical Fiber Cables — Installation Methods Within Buildings

722.160 Raceways, Cable Routing Assemblies, and Cable Trays for Optical Fiber Cables.

(A) Types of Raceways.

Optical fiber cables shall be permitted to be installed in any raceway that complies with 722.160(A)(1), (A)(2), or (A)(3).

(1) Raceways Recognized in Chapter 3.

Optical fiber cables shall be permitted to be installed in any raceway included in Chapter 3. The raceways shall be installed in accordance with the requirements of Chapter 3.

(2) Communications Raceways.

Optical fiber cables shall be permitted to be installed in listed communications raceways selected in accordance with Table 800.154(b).

(3) Innerduct for Optical Fiber Cables.

Listed plenum communications raceway, listed riser communications raceway, and listed general-purpose communications raceway selected in accordance with Table 800.154(b) shall be permitted to be installed as innerduct in any type of listed raceway permitted in Chapter 3.

(B) Raceway Fill for Optical Fiber Cables.

Raceway fill for optical fiber cables shall comply with either 722.160(B)(1) or (B)(2).

(1) Without Electric Light or Power Conductors.

Where optical fiber cables are installed in raceway without electric light or power conductors, the raceway fill requirements of Chapters 3 and 9 shall not apply.

(2) Nonconductive Optical Fiber Cables with Electric Light or Power Conductors.

Where nonconductive optical fiber cables are installed with electric light or power conductors in a raceway, the raceway fill requirements of Chapters 3 and 9 shall apply.

(C) Cable Routing Assemblies.

Optical fiber cables shall be permitted to be installed in listed cable routing assemblies selected in accordance with Table 800.154(c).

(D) Cable Trays.

Optical fiber cables shall be permitted to be installed in metal or listed nonmetallic cable tray systems.

722.161 Grounding.

Non-current-carrying conductive members of optical fiber cables shall be bonded to a grounded equipment rack or enclosure or grounded in accordance with the grounding methods specified by 770.100(B)(2).

722.162 Installation of Optical Fibers and Electrical Conductors.

(A) In Cable Trays and Raceways.

Conductive optical fiber cables contained in an armored or metal-clad-type sheath and nonconductive optical fiber cables shall be permitted to occupy the same cable tray or raceway with conductors for electric light, power, Class 1, non-power-limited fire alarm, Type ITC, or medium-power network-powered broadband communications circuits operating at 1000 volts or less. Conductive optical fiber cables without an armored or metal-clad-type sheath shall not be permitted to occupy the same cable tray or raceway with conductors for electric light, power, Class 1, non-power-limited fire alarm, Type ITC, or medium-power network-powered broadband communications circuits, unless all of the conductors of electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits are separated from all of the optical fiber cables by a permanent barrier or listed divider.

(B) In Cabinets, Outlet Boxes, and Similar Enclosures.

Nonconductive optical fiber cables shall not be permitted to occupy the same cabinet, outlet box, panel, or similar enclosure housing the electrical terminations of an electric light, power, Class 1, non-power-limited fire alarm or medium-power network-powered broadband communications circuit unless one or more of the following conditions exist:

- (1) The nonconductive optical fiber cables are functionally associated with the electric light, power, Class 1, non-power-limited fire alarm or medium-power network-powered broadband communications circuit.
- (2) The conductors for electric light, power, Class 1, non-power-limited fire alarm, Type ITC, or medium-power network-powered broadband communications circuits operate at 1000 volts or less.
- (3) The nonconductive optical fiber cables and the electrical terminations of electric light, power, Class 1, non-power-limited fire alarm or medium-power network-powered broadband communications circuit are installed in factory- or field-assembled control centers.

- (4) The nonconductive optical fiber cables are installed in an industrial establishment where conditions of maintenance and supervision ensure that only qualified persons service the installation.

When optical fibers are within the same composite cable for electric light, power, Class 1, non-power-limited fire alarm, or medium-power network-powered broadband communications circuits operating at 1000 volts or less, they shall be permitted to be installed only where the functions of the optical fibers and the electrical conductors are associated.

Optical fibers in composite optical fiber cables containing only current-carrying conductors for electric light, power, or Class 1 circuits rated 1000 volts or less shall be permitted to occupy the same cabinet, cable tray, outlet box, panel, raceway, or other termination enclosure with conductors for electric light, power, or Class 1 circuits operating at 1000 volts or less.

Optical fibers in composite optical fiber cables containing current-carrying conductors for electric light, power, or Class 1 circuits rated over 1000 volts shall be permitted to occupy the same cabinet, cable tray, outlet box, panel, raceway, or other termination enclosure with conductors for electric light, power, or Class 1 circuits in industrial establishments, where conditions of maintenance and supervision ensure that only qualified persons service the installation.

(C) With Other Circuits.

Optical fibers shall be permitted in the same cable, and conductive and nonconductive optical fiber cables shall be permitted in the same raceway, cable tray, box, enclosure, or cable routing assembly, with conductors of any of the following:

- (1) Class 2 and Class 3 remote-control, signaling, and power-limited circuits in compliance with Article 645 or Parts I and III of Article 725
- (2) Power-limited fire alarm systems in compliance with Parts I and III of Article 760
- (3) Communications circuits in compliance with Parts I and V of Article 805
- (4) Community antenna television and radio distribution systems in compliance with Parts I and V of Article 820
- (5) Low-power network-powered broadband communications circuits in compliance with Parts I and V of Article 830

Part V. Listing Requirements

722.179 Listing and Marking of Cables.

Cables installed in buildings shall be listed in accordance with 722.179(A) and marked in accordance with 722.179(B), and they shall be permitted to be marked in accordance with 722.179(C).

Exception: Optical fiber cables that are installed in compliance with 770.48 shall not be required to be listed.

(A) Listing of Cables.

Cables installed as wiring methods within buildings shall be listed as resistant to the spread of fire and other criteria in accordance with 722.179(A)(1) through (A)(13).

Informational Note No. 1: See UL 13, *Standard for Power-Limited Circuit Cables*, for applicable requirements for listing of Class 2 and Class 3 cable and power-limited tray cable (PLTC).

Informational Note No. 2: See UL 1424, *Cables for Power-Limited Fire-Alarm Circuits*, for applicable requirements for listing of power-limited fire alarm cable.

Informational Note No. 3: See UL 1651, *Optical Fiber Cable*, for applicable requirements for listing of optical fiber cable.

(1) Plenum Cable.

Plenum cable shall be listed as suitable for use in ducts, plenums, and other space for environmental air and shall be listed as having adequate fire-resistant and low-smoke producing characteristics. Refer to Table 722.179(B) for plenum cable types.

Informational Note: See NFPA 262-2019, *Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces*, for the test method used to determine that a cable is low-smoke producing and fire resistant, exhibiting a maximum peak optical density of 0.50 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less.

(2) Riser Cable.

Riser cable shall be listed as suitable for use in a vertical run in a shaft or from floor to floor and shall be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.

Informational Note: See ANSI/UL 1666-2012, *Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts*, for the cable requirements defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.

(3) General-Purpose Cable.

General-purpose cable shall be listed as suitable for general-purpose use, with the exception of risers, ducts, plenums, and other space used for environmental air, and shall be listed as resistant to the spread of fire.

Informational Note: See ANSI/UL 1685-2010, *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables*, for the UL flame exposure, vertical tray flame test that is used to determine resistance to the spread of fire when cables do not spread fire to the top of the tray. The smoke measurements in the test method are not applicable.

See CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*, for the CSA vertical flame test — cables in cable trays that can also be used to define resistance to the spread of fire when the damage (char length) does not exceed 1.5 m (4 ft 11 in.).

(4) Alternative General-Purpose Cable.

Alternative general-purpose optical fiber cable shall be listed as suitable for general-purpose use, with the exception of risers and plenums, and shall also be resistant to the spread of fire.

Informational Note: See CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*, for the CSA vertical flame test — cables in cable trays, that

can also be used to define resistance to the spread of fire when the damage (char length) does not exceed 1.5 m (4 ft 11 in.).

(5) Limited-Use Cable.

Limited-use cable shall be listed as suitable for use in dwellings and raceways and shall be listed as resistant to flame spread.

Informational Note: See ANSI/UL 2556, *Standard for Wire and Cable Test Methods*, for one method of determining that cable is resistant to flame spread by testing the cable to the FV-2/VW-1 test.

(6) Type PLTC.

Type PLTC nonmetallic-sheathed, power-limited tray cable shall be listed as being suitable for cable trays, resistant to the spread of fire, and sunlight- and moisture-resistant. Type PLTC cable used in a wet location shall be listed for use in wet locations and marked "wet" or "wet location."

Informational Note: See ANSI/UL 1685-2010, *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables*, for the UL flame exposure, vertical tray flame test that is used to determine resistance to the spread of fire when cables do not spread fire to the top of the tray. The smoke measurements in the test method are not applicable.

See CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*, for the CSA vertical flame test — cables in cable trays that can also be used to define resistance to the spread of fire when the damage (char length) does not exceed 1.5 m (4 ft 11 in.).

(7) Circuit Integrity (CI) Cable, Fire-Resistive Cable System, or Electrical Circuit Protective System.

Cables that are used for survivability of critical circuits under fire conditions shall meet either 722.179(A)(7)(a), (A)(7)(b), or (A)(7)(c).

Informational Note: See section 12.4.3 and 12.4.4 of NFPA 72-2022, *National Fire Alarm and Signaling Code*, for fire alarm CI cable, fire-resistive cable systems, or electrical circuit protective systems that may be used for fire alarm circuits to comply with the survivability requirements to maintain the circuit's electrical function during fire conditions for a defined period of time.

- (a) *CI Cables.* CI cables of the types specified in 722.179(A)(1), (A)(2), (A)(3), (A)(4), and (A)(6) and used for survivability of critical circuits shall be marked with the additional classification using the suffix "CI." To maintain its listed fire-resistive rating, CI cable shall only be installed in free air in accordance with 722.24(B). CI cables shall only be permitted to be installed in a raceway where specifically listed and marked as part of a fire-resistive cable system as covered in 722.179(A)(7)(b).

Informational Note: See UL 2196, *Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables*, as specified in UL 1425, *Cables for Non-Power-Limited Fire-Alarm Circuits*, for one method of defining CI cable by establishing a rating when tested. *UL Guide Information for Nonpower-limited Fire Alarm Circuits* (HNHT) contains information to identify the cable and its installation limitations to maintain the fire-resistive rating.

- (b) *Fire-Resistive Cables.* Fire-resistive cables of the types specified in 722.179(A)(1), (A)(2), (A)(3), (A)(4), (A)(6), and (A)(7)(a) that are part of a fire-resistive cable system shall be identified with the system identifier and hourly rating marked on the protectant or the smallest unit container and installed in accordance with the listing of the system.

Informational Note: One method of defining a fire-resistive cable system is by establishing a rating when tested in accordance with UL 2196, *Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables. UL Guide Information for Electrical Circuit Integrity Systems* (FHIT) contains information to identify the system and its installation limitations to maintain a minimum fire-resistive rating.

- (c) *Electrical Circuit Protective System.* Protectants for cables of the types specified in 722.179(A)(1), (A)(2), (A)(3), (A)(4), and (A)(6) that are part of an electrical circuit protective system shall be identified with the protective system identifier and hourly rating marked on the protectant or the smallest unit container and installed in accordance with the listing of the protective system.

Informational Note: See UL 1724, *Fire Tests for Electrical Circuit Protective Systems*, for one method of defining an electrical circuit protective system by establishing a rating when tested in accordance with. *UL Guide Information for Electrical Circuit Integrity Systems* (FHIT) contains information to identify the system and its installation limitations to maintain the fire-resistive rating.

(8) Class 3 Single Conductors.

Class 3 single conductors used as other wiring within buildings shall be listed Type CL3 and shall not be smaller than 18 AWG.

Informational Note: See ANSI/UL 1685-2010, *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables*, for the UL flame exposure, vertical tray flame test that is used to determine resistance to the spread of fire when cables do not spread fire to the top of the tray. The smoke measurements in the test method are not applicable.

See CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*, for the CSA vertical flame test — cables in cable trays that can also be used to define resistance to the spread of fire when the damage (char length) does not exceed 1.5 m (4 ft 11 in.).

(9) Limited Power (LP) Cable.

Class 2 and Class 3 LP cables shall be listed as suitable for carrying power and data up to a specified current limit for each conductor without exceeding the temperature rating of the cable. The cables shall be marked with the suffix “-LP (XXA)” where XXA designates the current limit is in amperes per conductor.

Informational Note: An example of the marking on 23 AWG, 4-pair, Class 2 cable rated 75°C with an LP current rating of 0.6 amperes per conductor is “CL2-LP (0.6A) (75°C) 23 AWG 4-pair.”

(10) Undercarpet Cables.

Undercarpet cable shall be listed as suitable for use under carpet, floor covering, modular tiles, and planks.

Informational Note: See UL 444, *Standard for Safety for Communications Cables*, for the compressive loading test used to determine the suitability of cable for undercarpet use.

(11) Wet Locations.

Cable used in a wet location shall be listed for use in wet locations and be marked "wet" or "wet location" or have a moisture-impervious metal sheath.

(12) Field-Assembled Optical Fiber Cables.

Field-assembled optical fiber cable shall comply with 722.179(A)(12)(a) through (d).

(a)

The specific combination of jacket and optical fibers intended to be installed as a field-assembled optical fiber cable shall be one of the types in 722.179(A)(1), (A)(2), or (A)(3) and shall be marked in accordance with Table 179(B).

(b)

The jacket of a field-assembled optical fiber cable shall have a surface marking indicating the specific optical fibers with which it is identified for use.

(c)

The optical fibers shall have a permanent marking, such as a marker tape, indicating the jacket with which they are identified for use.

(d)

The jacket without fibers shall meet the listing requirements for communications raceways in 800.182(A), (B), or (C) in accordance with the cable marking.

(13) Cables Containing Optical Fibers.

Composite optical fiber cables shall be listed as electrical cables based on the type of electrical conductors.

(B) Marking.

Cables shall be durably marked on the surface in accordance with the following. The AWG size or circular mil area shall be repeated at intervals not exceeding 610 mm (24 in.). All other markings shall be repeated at intervals not exceeding 1.0 m (40 in.).

- (1) The proper type designation for the type of cable in accordance with Table 179(B).
- (2) The manufacturer's name, trademark, or other distinctive marking by which the organization responsible for the product can be readily identified.
- (3) The AWG size or circular mil area.

Informational Note: See Chapter 9, Table 8, Conductor Properties, for conductor area expressed in SI units for conductor sizes specified in AWG or circular mil area.

(4) The temperature rating for a temperature rating exceeding 60°C (140°F).

Informational Note: A minimum temperature rating of 60°C is assumed for cables not marked with a temperature rating.

(5) Voltage ratings shall not be marked on the cables.

Exception: Voltage markings shall be permitted where the cable has multiple listings and a voltage marking is required for one or more of the listings.

Informational Note: Voltage markings on cables could be misinterpreted to suggest that the cables may be suitable for Class 1 electric light and power applications.

Table 722.179(B) Cable Type Markings

<u>Cable Type</u>	<u>Cable Marking</u>
<u>Class 3 plenum cable</u>	<u>CL3P</u>
<u>Class 2 plenum cable</u>	<u>CL2P</u>
<u>Power limited fire alarm plenum cable</u>	<u>FPLP</u>
<u>Nonconductive optical fiber plenum cable</u>	<u>OFNP</u>
<u>Conductive optical fiber plenum cable</u>	<u>OFCP</u>
<u>Class 3 riser cable</u>	<u>CL3R</u>
<u>Class 2 riser cable</u>	<u>CL2R</u>
<u>Power limited fire Alarm Riser Cable</u>	<u>FPLR</u>
<u>Nonconductive optical fiber riser cable</u>	<u>OFNR</u>
<u>Conductive optical fiber riser cable</u>	<u>OFCR</u>
<u>Class 3 general-purpose cable</u>	<u>CL3</u>
<u>Class 2 general-purpose cable</u>	<u>CL2</u>
<u>Power limited fire alarm cable</u>	<u>FPL</u>
<u>Nonconductive general-purpose optical fiber cable</u>	<u>OFN</u>
<u>Conductive general-purpose optical fiber cable</u>	<u>OFC</u>
<u>Alternative nonconductive general-purpose optical fiber cable</u>	<u>OFNG</u>
<u>Alternative conductive general-purpose optical fiber cable</u>	<u>OFNG</u>
<u>Class 3 cable — limited use</u>	<u>CL3X</u>
<u>Class 2 cable — limited use</u>	<u>CL2X</u>
<u>Undercarpet cable</u>	<u>CMUC</u>

Note: All types of CL2, CL3, and FPL cables containing optical fibers are provided with the suffix “-OF.”

Informational Note: Cable types are listed in descending order of fire resistance rating.

(C) Optional Markings.

Cables shall be permitted to be surface marked to indicate special characteristics of the cable materials.

Informational Note No. 1: These markings include, but are not limited to, markings for limited smoke, halogen free, low smoke and halogen free, and sunlight resistant.

Informational Note No. 2: Some examples of optional markings are ST1 to indicate limited smoke characteristics in accordance with UL 2556, *Wire and Cable Test Methods*; HF to indicate halogen free as described in UL 2885, *Outline of Investigation for Acid Gas, Acidity and Conductivity of Combusted Materials*; and LSHF to indicate halogen free and low-smoke characteristics in accordance with IEC 61034-2, *Measurement of smoke density of cables burning under defined conditions — Part 2: Test procedure and requirements*.

**First Revision No. 9591-NFPA 70-2021 [Global Input]**

See attached Word file for new Article 724.

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
New_Article_724.docx	This is what new article 724 should look like if this ballot passes. For staff use	
New_Article_724 - _Shows_Extractions.docx	For staff use only. This document reveals where the language originated from. These are not true extractions and only used for my notes but thought it may be helpful for others. For staff use	
NEC_Global_FR- 9591_Article_724_NEW_for_ballot.pdf	For ballot	

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Mon Jan 25 10:39:12 EST 2021

Committee Statement

Committee Statement: The Class 1 definition was changed and applies only to the power limited circuits. Historically, Class 1 circuits included non-power limited Class 1 and power limited Class 1. The new definition has deleted the load side of the overcurrent device and now only covers the power limited circuits with a maximum 30-volts, 1000-volt amperes.

A new article has been created for Class 1 circuits that are power limited. Since Class 2 and Class 3 circuit are limited to because these circuits are not power limited to 100 VA, as are class 2 and class 3 circuits having them in a separate article adds clarity and usability to the code. Class 2 and Class 3 circuits have a common element of 100VA. and therefore should not be in the same article with class 2 and class 3 circuits. PI Public input 2775 removes the corresponding references to Class 1 circuits from Article 725.

Power limited Class 1 remote-control and signaling circuits have been included in the scope of this new article because they were originally covered in Article 725. Non-power limited RC&S circuits are not covered by this new article because the installation of these circuits is covered by the first four chapters of the NEC and there are no special conditions associated with these circuits.

The entire Panel 3 needs to look at the applicability of Article 450 to power limited Class 1 circuits. See 724.41 (A), Class 1 Transformers, and Table 450.3(B).

Response Message: FR-9591-NFPA 70-2021

[Public Input No. 2775-NFPA 70-2020 \[Global Input\]](#)

[Public Input No. 2774-NFPA 70-2020 \[New Article after 725\]](#)

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

18 Affirmative All
2 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Christakos, Andrew C.
Sleights, John E.

Affirmative All

Anderson, Richard S.
Bassett, Douglas P.
Burlison, Steven D.
Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Jones, Robert A.

This revision makes it clear that a Class 1 circuit is limited to 30 volts and 1000VA. Previous editions of the NEC included a non-power limited Class 1 circuit which has caused confusion with AHJs and installers. Installation requirements for Class 1 circuits are contained within this new article and non-power limited circuit installation requirements will be covered by the first four chapters of the NEC.

Tellas, Ronald
agreed.

Article 724 Class 1 Circuits

Part I. General.

724.1 Scope.

This article covers Class 1 circuits, including power-limited Class 1 remote control and signaling circuits, that are not an integral part of a device or utilization equipment.

724.3 Other Articles.

In addition to the requirements of this article, circuits and equipment shall comply with the requirements in 724.3(A) through (J). Only those sections of Article 300 referenced in this article shall apply to Class 1 circuits.

(A) Number and Size of Conductors in Raceway.

The number and size of conductors shall comply with the requirements of 300.17.

(B) Spread of Fire or Products of Combustion.

Installation of Class 1 circuits shall comply with the requirements of 300.21.

(C) Ducts, Plenums, and Other Air-Handling Spaces.

Class 1 circuits installed in ducts, plenums, and other spaces used for environmental air shall comply with the requirements of 300.22.

(D) Hazardous (Classified) Locations.

Class 1 circuits shall not be installed in any hazardous (classified) locations except as permitted by other articles of this Code.

(E) Cable Trays.

Cable tray installations shall comply with the requirements of Parts I and II of Article 392.

(F) Raceways Exposed to Different Temperatures.

Installation of raceways shall comply with the requirements of 300.7(A).

(G) Vertical Support for Fire-Rated Cables and Conductors.

Vertical installations of circuit integrity (CI) cables and conductors installed in a raceway or conductors and cables of electrical circuit protective systems shall comply with the requirements of 300.19.

(H) Bushings.

Bushings shall be installed where cables emerge from raceways used for mechanical support or protection in accordance with 300.15(C).

(I) Installation of Conductors With Other Systems.

Installation of conductors with other systems shall comply with the requirements of 300.8.

(J) Identification of Equipment Grounding Conductors.

Equipment grounding conductors shall be identified in accordance with 250.119.

724.21 Access to Electrical Equipment Behind Panels Designed to Allow Access.

Access to electrical equipment shall not be denied by an accumulation of wires and cables preventing the removal of panels, including suspended ceiling panels.

724.24 Mechanical Execution of Work.

Class 1 circuits shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed on the surfaces of ceilings and sidewalls shall be supported by the building structure such that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, hangers, cable ties, or similar fittings that are designed and installed to not damage the cable. The installation shall also comply with the requirements of 300.4 and 300.11.

Informational Note: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants can result in an undetermined alteration of Class 1 cable properties.

724.30 Class 1 Circuit Identification.

Class 1 circuits shall be identified at terminal and junction locations in a manner that prevents unintentional interference with other circuits during testing and servicing.

724.31 Safety-Control Equipment.

If controlling safety-control equipment, Class 1 circuits shall be provided with physical protection if the failure of such equipment to operate introduces a direct fire or life hazard. All conductors of such circuits shall be installed in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, electrical metallic tubing, Type MI cable, or Type MC cable, or be otherwise suitably protected from physical damage.

724.40 Class 1 Circuits.

Class 1 circuits shall be supplied from a source with a rated output of not more than 30 volts and 1000 volt-amperes.

(A) Class 1 Transformers.

Transformers used to supply Class 1 circuits shall comply with the requirements of the applicable sections of Parts I and II of Article 450.

(B) Other Class 1 Power Sources.

Power sources other than transformers shall be protected by overcurrent devices rated at not more than 167 percent of the volt-ampere rating of the source divided by the rated voltage. The overcurrent devices shall not be interchangeable with overcurrent devices of higher ratings. The overcurrent device shall be permitted to be an integral part of the power supply.

To comply with the 1000 volt-ampere limitation of 724.41, the maximum output (VA_{max}) of power sources other than transformers shall be limited to 2500 volt-amperes, and the product of the maximum current (I_{max}) and maximum voltage (V_{max}) shall not exceed 10,000 volt-amperes. These ratings shall be determined with any overcurrent-protective device bypassed.

VA_{max} is the maximum volt-ampere output after one minute of operation regardless of load and with overcurrent protection bypassed, if used. Current-limiting impedance shall not be bypassed when determining VA_{max} .

I_{max} is the maximum output current under any noncapacitive load, including short circuit, and with overcurrent protection bypassed, if used. Current-limiting impedance should not be bypassed when determining I_{max} . Where a current-limiting impedance listed for the purpose or as part of a listed product is used in combination with a stored energy source, such as a storage battery, to limit the output current, I_{max} limits apply after 5 seconds.

V_{max} is the maximum output voltage regardless of load with rated input applied.

724.43 Class 1 Circuit Overcurrent Protection.

Overcurrent protection for conductors 14 AWG and larger shall be provided in accordance with the conductor ampacity, without applying the ampacity adjustment and correction factors specified in 310.14 to the ampacity calculation. Overcurrent protection shall not exceed 7 amperes for 18 AWG conductors and 10 amperes for 16 AWG.

Exception: Where other articles of this Code permit or require other overcurrent protection.

724.45 Class 1 Circuit Overcurrent Device Location.

Overcurrent devices shall be located as specified in 724.45(A) through (E).

(A) Point of Supply.

Overcurrent devices shall be located at the point where the conductor to be protected receives its supply.

(B) Feeder Taps.

Class 1 circuit conductors shall be permitted to be tapped, without overcurrent protection at the tap, where the overcurrent device protecting the circuit conductor is sized to protect the tap conductor.

(C) Branch-Circuit Taps.

Class 1 circuit conductors 14 AWG and larger that are tapped from the load side of the overcurrent protective device(s) of a controlled light and power circuit shall require only short-circuit and ground-fault protection and shall be permitted to be protected by the branch-circuit overcurrent protective device(s) where the rating of the protective device(s) is not more than 300 percent of the ampacity of the Class 1 circuit conductor.

(D) Primary Side of Transformer.

Class 1 circuit conductors supplied by the secondary of a single-phase transformer having only a 2-wire (single-voltage) secondary shall be permitted to be protected by overcurrent protection provided on the primary side of the transformer if the protection is in accordance with 450.3 and does not exceed the value determined by multiplying the secondary conductor ampacity by the secondary-to-primary transformer voltage ratio. Transformer secondary conductors other than 2-wire shall not be considered to be protected by the primary overcurrent protection.

(E) Input Side of Electronic Power Source.

Class 1 circuit conductors supplied by the output of a single-phase, listed electronic power source other than a transformer having only a 2-wire (single-voltage) output for connection to Class 1 circuits shall be permitted to be protected by overcurrent protection provided on the input side of the electronic power source if the protection

does not exceed the value determined by multiplying the Class 1 circuit conductor ampacity by the output-to-input voltage ratio. Electronic power source outputs other than 2-wire (single voltage) shall not be considered to be protected by the primary overcurrent protection.

724.46 Class 1 Circuit Wiring Methods.

Class 1 circuits shall be installed in accordance with Part I of Article 300 and the wiring methods from the appropriate articles in Chapter 3.

Exception No. 1: The requirements of 724.48 through 724.51 shall be permitted to apply in installations of Class 1 circuits.

Exception No. 2: Methods permitted or required by other articles of this Code shall apply to installations of Class 1 circuits.

724.48 Conductors of Different Circuits in the Same Cable, Cable Tray, Enclosure, or Raceway.

Class 1 circuits shall be permitted to be installed with other circuits as specified in 724.48(A) and (B).

(A) Two or More Class 1 Circuits.

Class 1 circuits shall be permitted to occupy the same cable, cable tray, enclosure, or raceway regardless of whether the individual circuits are alternating current or direct current if all conductors are insulated for the maximum voltage of any conductor in the cable, cable tray, enclosure, or raceway.

(B) Class 1 Circuits with Power-Supply Circuits.

Class 1 circuits shall be permitted to be installed with power-supply conductors as specified in 724.48 (B)(1) through (B)(4).

(1) In Cables, Enclosures, or Raceways.

Class 1 circuits and power-supply circuits shall be permitted to occupy the same cable, enclosure, or raceway without a barrier only where the equipment powered is functionally associated. Class 1 circuits shall be permitted to be installed together with the conductors of electric light, power, non-power-limited fire alarm systems, and medium-power network-powered broadband communications circuits where separated by a barrier.

(2) In Factory- or Field-Assembled Control Centers.

Class 1 circuits and power-supply circuits shall be permitted to be installed in factory- or field-assembled control centers.

(3) In Manholes.

Class 1 circuits and power-supply circuits shall be permitted to be installed as underground conductors in manholes in accordance with one of the following:

- (1) The power-supply or Class 1 circuit conductors are in metal-enclosed cable or Type UF cable.
- (2) The conductors are permanently separated from power-supply conductors by continuous firmly fixed nonconductors, such as flexible tubing, in addition to insulation on the wire.

- (3) The conductors are permanently and effectively separated from power-supply conductors and securely fastened to racks, insulators, or other approved supports.

(4) In Cable Trays.

Installations in cable trays shall comply with the requirements of one of the following:

- (1) Class 1 circuit conductors and power-supply conductors not functionally associated with the Class 1 circuit conductors shall be separated by a solid fixed barrier of a material compatible with the cable tray.
- (2) Class 1 circuit conductors and power-supply conductors not functionally associated with the Class 1 circuit conductors shall be permitted to be installed in a cable tray without barriers where all of the conductors are installed with separate multiconductor Type AC, Type MC, Type MI, or Type TC cables and all the conductors in the cables are insulated at 600 volts or greater.

724.49 Class 1 Circuit Conductors.

(A) Sizes and Use.

Conductors that are 18 AWG and 16 AWG shall be permitted to be used if they supply loads that do not exceed the ampacities specified in 402.5 and are installed in a raceway, an approved enclosure, or a listed cable. Conductors larger than 16 AWG shall not supply loads greater than the ampacities specified in 310.14. Flexible cords shall comply with the requirements of Article 400.

(B) Insulation.

Insulation on conductors shall be rated for the system voltage and not less than 600 volts. Conductors larger than 16 AWG shall comply with the requirements of Article 310. Conductors that are 18 AWG and 16 AWG shall be Type FFH-2, Type KF-2, Type KFF-2, Type PAF, Type PAFF, Type PF, Type PFF, Type PGF, Type PGFF, Type PTF, Type PTFF, Type RFH-2, Type RFHH-2, Type RFHH-3, Type SF-2, SFF-2, Type TF, Type TFF, Type TFFN, Type TFN, Type ZF, or Type ZFF. Conductors with other types and thicknesses of insulation shall be permitted if listed for Class 1 circuit use.

724.51 Number of Conductors in Cable Trays and Raceways, and Ampacity Adjustment.

(A) Class 1 Circuit Conductors.

Where only Class 1 circuit conductors are in a raceway, the number of conductors shall be determined in accordance with 300.17. The ampacity adjustment factors specified in 310.15(C)(1) shall apply only if such conductors carry continuous loads in excess of 10 percent of the ampacity of each conductor.

(B) Power-Supply Conductors and Class 1 Circuit Conductors.

Where power-supply conductors and Class 1 circuit conductors are permitted in a raceway in accordance with 724.48, the number of conductors shall be determined in accordance with 300.17. The ampacity adjustment factors specified in 310.15(C)(1) shall apply as follows:

- (1) To all conductors where the Class 1 circuit conductors carry continuous loads in excess of 10 percent of the ampacity of each conductor and where the total number of conductors is more than three
- (2) To the power-supply conductors only, where the Class 1 circuit conductors do not carry continuous loads in excess of 10 percent of the ampacity of each conductor and where the number of power-supply conductors is more than three

(C) Class 1 Circuit Conductors in Cable Trays.

Where Class 1 circuit conductors are installed in cable trays, they shall comply with the requirements of 392.22 and 392.80(A).

724.52 Circuits Extending Beyond One Building.

Class 1 circuits that extend aurally beyond one building shall also meet the requirements of Part I of Article 225.



First Revision No. 9602-NFPA 70-2021 [Global Input]

Revise Article 725 per the attached.

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
2020_NEC_Article_725_This_shows_what_725_will_look_like_with_technical_changes_CLEAN.docx	Clean. For staff use	
2020_NEC_Article_725_This_shows_what_725_will_look_like_with_technical_changes_CLEAN.docx	For staff use	
NEC_Global_FR-9602_Article_725_for_ballot.pdf	For ballot	

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Wed Jan 27 14:13:49 EST 2021

Committee Statement

Committee Statement: This public input was developed by a Panel 3 appointed task group to address redundant cabling requirements in Articles 725, 760 and 770. The Panel 3 task group members included TG Chairman Randy Ivans (Panel 3 Principal, Panel 16 Alternate), Robert Jones (Chairman Panel 3), Paul Casparro, Shane Clary, Michael Cogbill, Chad Jones, Ward Judson, Tim Mikloiche, Samuel Rokowski, George Straniero, Ron Tellas, and George Zimmerman. The TG was broad-based and specifically included representation of those with knowledge and experience in electrical safety, installation, code enforcement, and wire and cable.

This proposed new Article combines common cabling requirements currently found in Articles 725, 760, and 770 and also relocates other cabling requirements from those articles into a single article. The proposal also removes the redundancy between the text-based requirements in 725.135, 760.135 and 770.113, and the tabular requirements in Tables 725.154, 760.154 and 770.154 by including most of the requirements only in tabular form. This has been found to be more user-friendly. Some of the text-based requirements do not lend themselves to being represented in tabular form and remain as text in the new Article. In some cases, such as 725.144, the cable requirements are integrated with equipment requirements and were not moved. In the case of 725.144 a pointer was added in the new article for clarity. The new Article is being proposed in Public Input No. 3671.

This PI deletes or modifies text in the original Article 725 to accommodate the above consolidation of requirements. Hazardous locations was moved from 725.3 to a new 725.12 to simplify the references. The reference in 725.24 was changed from 300.4(D) to 300.11 since 300.4(D) deals with cables which are being relocated and 300.11 includes equipment. It should be noted that parallel sections 770.24 and 800.24 both already reference 300.11.

The work of the TG also proposes moving Class 1 circuits into a new Article. This is being handled by separate PIs. PI 2775 Goba Input for deletion of Class 1 from Article 725. PI 2774 for the new New Article for Class 1 circuits.

These changes significantly improve clarity and usability while removing redundant requirements. It is not the intent of these proposals to introduce any technical changes. Some editorial errors were found during this process and fixed within this PI. If this PI is resolved, there are separate PIs submitted to fix those issues. Multiple companion public inputs are submitted throughout the NEC as part of this overall effort.

Response Message: FR-9602-NFPA 70-2021

[Public Input No. 3868-NFPA 70-2020 \[Global Input\]](#)

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

ARTICLE 725, Class 2, and Class 3 Power-Limited Circuits

Part I. General

725.1 Scope. This article covers power-limited circuits, including power limited remote control and signaling circuits, that are not an integral part of a device or of utilization equipment.

Informational Note: The circuits described herein are characterized by usage and electrical power limitations that differentiate them from electric light and power circuits; therefore, alternative requirements to those of Chapters 1 through 4 are given with regard to minimum wire sizes, ampacity adjustment and correction factors, overcurrent protection, insulation requirements, and wiring methods and materials.

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

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

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

725.3 Other Articles. In addition to the requirements of this article, circuits and equipment shall comply with the articles or sections listed in 725.3(A) through (Q). Only those sections of Article 300 referenced in this article shall apply to Class 2, and Class 3 circuits.

~~(A) Number and Size of Conductors in Raceway:~~

~~The number and size of conductors shall comply with 300.17.~~

~~(AB) Spread of Fire or Products of Combustion.~~

~~Installation of Class 2, and Class 3 circuits shall comply with 300.21.~~

~~(BC) Ducts, Plenums, and Other Air-Handling Spaces.~~

~~Class 2, and Class 3 circuits installed in ducts, plenums, or other space used for environmental air shall comply with 300.22.~~

~~Exception No. 1: Class 2 and Class 3 cables selected in accordance with Table 725.154 and installed in accordance with 725.135(B) and 300.22(B), Exception shall be permitted to be installed in ducts specifically fabricated for environmental air.~~

~~Exception No. 2: Class 2 and Class 3 cables selected in accordance with Table 725.154 and installed in accordance with 725.135(C) shall be permitted to be installed in other spaces used for environmental air (plenums).~~

~~(D) Hazardous (Classified) Locations:~~

~~Class 2, and Class 3 circuits installed in hazardous (classified) locations shall comply with 501.10(B)(1), 501.150, 502.10(B)(1), 502.150, 503.10(A)(1), 503.150, 506.15(A), 506.15(C), 511.7(B)(1), 515.7(A), and Article 517, Part IV.~~

~~(E) Cables for Class 2 and Class 3 Circuits.~~

~~The listing and installation of cables for Class 2 and Class 3 circuits shall comply with Article 722 Parts I, II and V.~~

~~(F) Cable Trays:~~

~~Parts I and II of Article 392, where installed in cable tray.~~

~~(CG) Motor Control Circuits.~~

~~Motor control circuits tapped from the load side of the motor branch-circuit protective device(s) as specified in 430.72(A) shall comply with Part IV of Article 430.~~

~~(H) Instrumentation Tray Cable:~~

~~See 727.1 and 727.4 through 727.9.~~

~~(I) Raceways Exposed to Different Temperatures:~~

~~Installations shall comply with 300.7(A).~~

~~(J) Vertical Support for Fire-Resistive Cables and Conductors:~~

~~Vertical installations of circuit integrity (CI) cables and conductors installed in a raceway or conductors and cables of fire-resistive cable systems shall be installed in accordance with 300.19.~~

~~(K) Bushing:~~

~~A bushing shall be installed where cables emerge from raceway used for mechanical support or protection in accordance with 300.15(C).~~

~~(L) Installation of Conductors with Other Systems:~~

~~Installations shall comply with 300.8.~~

~~(M) Corrosive, Damp, or Wet Locations:~~

~~Class 2 and Class 3 cables installed in corrosive, damp, or wet locations shall comply with the applicable requirements in 110.11, 300.5(B), 300.6, 300.9, and 310.10(F).~~

~~(N) Cable Routing Assemblies:~~

~~Class 2, Class 3, and Type PLTC cables shall be permitted to be installed in plenum cable routing assemblies, riser cable routing assemblies, and general purpose cable routing assemblies selected in accordance with Table 800.154(c), listed in accordance with 800.182, and installed in accordance with 800.110(C) and 800.113.~~

~~(O) Communications Raceways:~~

~~Class 2, Class 3, and Type PLTC cables shall be permitted to be installed in plenum communications raceways, riser communications raceways, and general purpose communications raceways selected in accordance with Table 800.154(b), listed in accordance with 800.182, and installed in accordance with 800.113 and 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing (ENT) apply.~~

~~(P) Temperature Limitation of Class 2 and Class 3 Cables.~~

~~The requirements of 310.14(A)(3) on the temperature limitation of conductors shall apply to Class 2 and Class 3 cables.~~

~~(QD) Identification of Equipment Grounding Conductors.~~

~~Equipment grounding conductors shall be identified in accordance with 250.119.~~

~~Exception: Conductors with green insulation shall be permitted to be used as ungrounded signal conductors for Types CL3P, CL2P, CL3R, CL2R, CL3, CL2, CL3X, CL2X, and substitute cables installed in accordance with 725.154(A).~~

725.12 Uses not Permitted.

Cables and equipment shall not be installed in any hazardous (classified) location, except as permitted by other articles of this Code.

Informational Note: Hazardous locations are covered in Articles 500 through 516 and in Article 517 Part IV.

725.21 Access to Electrical Equipment Behind Panels Designed to Allow Access. Access to electrical equipment shall not be denied by an accumulation of wires and cables that prevents removal of panels, including suspended ceiling panels.

725.24 Mechanical Execution of Work.

(A) General Class 1, Class 2, and Class 3 circuits shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, hangers, cable ties **listed and identified for securement and support**, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4 and 300.11

(B) Circuit integrity (CI) cable shall be supported at a distance not exceeding 610 mm (24 in.). Cable shall be secured to the noncombustible surface of the building structure. Cable supports and fasteners shall be steel.

725.30 Class 1, Class 2, and Class 3 Circuit Identification. Class 2, and Class 3 circuits shall be identified at terminal and junction locations in a manner that prevents unintentional interference with other circuits during testing and servicing.

725.31 Safety-Control Equipment.

Where damage to power-limited circuits can result in a failure of safety-control equipment that would introduce a direct fire or life hazard, the power-limited circuits shall be installed in accordance with 722.31. Room thermostats, water temperature regulating devices, and similar controls used in conjunction with electrically controlled household heating and air conditioning shall not be considered safety-control equipment.

Part II. Class 2 and Class 3 Circuits

725.121 Power Sources for Class 2 and Class 3 Circuits.

725.121(A) Power Source. The power source for a Class 2 or a Class 3 circuit shall be as follows:

Informational Note No. 1: Informational Note Figure 725.121 illustrates the relationships between Class 2 or Class 3 power sources, their supply, and the Class 2 or Class 3 circuits.

Informational Note No. 2: Table 11(A) and Table 11(B) in Chapter 9 provide the requirements for listed Class 2 and Class 3 power sources.

- (1) A listed Class 2 or Class 3 transformer
- (2) A listed Class 2 or Class 3 power supply
- (3) Other listed equipment marked to identify the Class 2 or Class 3 power source

Exception No. 1 to (3): Thermocouples shall not require listing as a Class 2 power source.

Exception No. 2 to (3): Limited power circuits of listed equipment where these circuits have energy levels rated at or below the limits established in Chapter 9, Table 11(A) and Table 11(B).

Informational Note: Examples of other listed equipment are as follows:

- (1) A circuit card listed for use as a Class 2 or Class 3 power source where used as part of a listed assembly
 - (2) A current-limiting impedance, listed for the purpose, or part of a listed product, used in conjunction with a non-power-limited transformer or a stored energy source, for example, storage battery, to limit the output current
 - (3) A thermocouple
 - (d) Limited voltage/current or limited impedance secondary communications circuits of listed industrial control equipment
- (4) Listed audio/video, information technology (computer), communications, and industrial equipment limited-power circuits

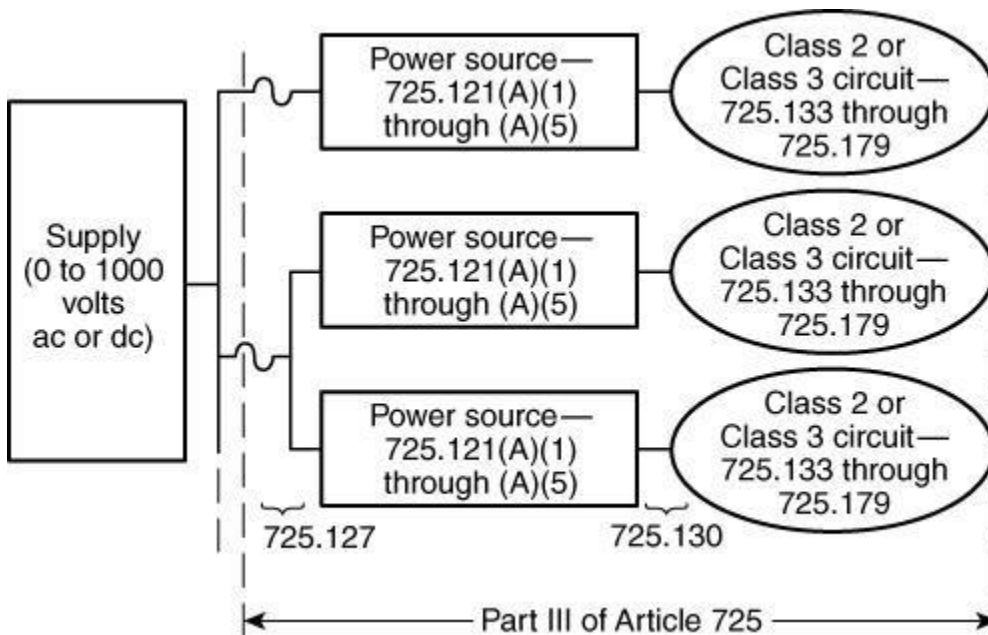
Informational Note: One way to determine applicable requirements for listing of information technology (computer) equipment is to refer to UL 60950-1-2011, *Standard for Safety of Information Technology Equipment*. Another way to

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Copyright © 2021 NFPA, and may not be used for any other purpose or distributed to any other persons or parties. determine applicable requirements for listing of audio/video, information technology, and communications equipment is to refer to UL 62368-1-2014, *Safety of audio/video, information and communication technology equipment*. Typically such circuits are used to interconnect data circuits for the purpose of exchanging information data. One way to determine applicable requirements for listing of industrial equipment is to refer to UL 61010-2-201, *Safety requirements for electrical equipment for measurement, control, and laboratory use — Part 2-201: Particular requirements for control equipment*, and/or UL 61800-5-1, *Adjustable speed electrical power drive systems — Part 5-1: Safety requirements — Electrical, thermal and energy*.

(5) A battery source or battery source system that is listed and identified as Class 2

725.121(B) Interconnection of Power Sources. Class 2 or Class 3 power sources shall not have the output connections paralleled or otherwise interconnected unless listed for such interconnection.



725.121(C) Marking. The equipment supplying the circuits shall be durably marked where plainly visible to indicate each circuit that is a Class 2 or Class 3 circuit.

The power sources for limited power circuits in 725.121(A)(3), limited power circuits for listed audio/video equipment, listed information technology equipment, listed communications equipment, and listed industrial equipment in 725.121(A)(4) shall have a label indicating the maximum voltage and rated current output per conductor for each connection point on the power source. Where multiple connection points have the same rating, a single label shall be permitted to be used. For equipment with a rated current per conductor less than 0.3 amperes, the effective date shall be January 1, 2021.

Informational Note No. 1: Rated current for power sources covered in 725.144 is the output current per conductor the power source is designed to deliver to an operational load at normal operating conditions, as declared by the manufacturer.

Informational Note No. 2: An example of a label is “52V @ 0.433A, 57V MAX” for an IEEE 802.3 compliant Class 8 power source.

725.127 Wiring Methods on Supply Side of the Class 2 or Class 3 Power Source. Conductors and equipment on the supply side of the power source shall be installed in accordance with the appropriate requirements of Chapters 1 through 4. Transformers or other devices supplied from electric light or power circuits shall be protected by an overcurrent device rated not over 20 amperes.

Exception: The input leads of a transformer or other power source supplying Class 2 and Class 3 circuits shall be permitted to be smaller than 14 AWG, but not smaller than 18 AWG if they are not over 305 mm (12 in.) long and if they have insulation that complies with [725.49\(B\)](#).

725.130 Wiring Methods and Materials on Load Side of the Class 2 or Class 3 Power Source. Parts I, II and V of Article 722 shall apply to wiring methods and materials on load side of the class 2 or class 3 power source.

(A) Class 1 Wiring Methods and Materials.

It shall be permitted to use Class 1 wiring methods for Class 2 and Class 3 circuits. Separation from Electric Light, Power, Class 1, Non-Power-Limited Fire Alarm Circuit Conductors, and Medium-Power Network-Powered Broadband Communications Cables shall comply with 725.136.

Exception No. 1: The ampacity adjustment factors given in 310.15(C)(1) shall not apply.

(B) Class 2 and Class 3 Wiring Methods and Materials.

Conductors on the load side of the power source shall be insulated in accordance with 725.179 and shall be installed in accordance with 725.133 and 725.154.

Exception No. 1: As provided for in 620.21 for elevators and similar equipment.

Exception No. 2: Other wiring methods and materials installed in accordance with 725.3 shall be permitted to extend or replace the conductors and cables described in 725.179 and permitted by 725.130(B).

Exception No. 3: Bare Class 2 conductors shall be permitted as part of a listed intrusion protection system where installed in accordance with the listing instructions for the system.

725.144 . Bundling of 4-Pair Cables Transmitting Power and Data

Sections 725.144(A) and (B) shall apply to Class 2 and Class 3 circuits that transmit power and data to a powered device over listed 4-pair (8 conductor) cabling. Section 300.11 and Parts I and III of Article 725 shall apply to Class 2 and Class 3 circuits that transmit power and data. The conductors that carry power for the data circuits shall be copper. The current in the power circuit shall not exceed the current limitation of the connectors.

Informational Note No. 1: One example of the use of cables that transmit power and data is the connection of closed-circuit TV cameras (CCTV).

Informational Note No. 2: The 8P8C connector is in widespread use with powered communications systems. IEC 60603-7-2008, *Connectors for electronic equipment — Part 7-1: Detail specification for 8-way, unshielded, free and fixed connectors*, specifies these connectors to have a current-carrying capacity per contact of 1.0 amperes maximum at 60°C (149°F). See IEC 60603-7 for more information on current-carrying capacity at higher and lower temperatures.

Informational Note No. 3: The requirements of Table 725.144 were derived for carrying power and data over 4-pair copper balanced twisted pair cabling. This type of cabling is described in ANSI/TIA 568-C.2-2009, *Commercial Building Telecommunications Cabling Standard — Part 2: Balanced Twisted-Pair Telecommunications Cabling and Components*.

Informational Note No. 4: See TIA-TSB-184-A-2017, *Guidelines for Supporting Power Delivery Over Balanced Twisted-Pair Cabling*, for information on installation and management of balanced twisted pair cabling supporting power delivery.

Informational Note No. 5: See ANSI/NEMA C137.3-2017, *American National Standard for Lighting Systems — Minimum Requirements for Installation of Energy Efficient Power over Ethernet (PoE) Lighting Systems*, for information on installation of cables for PoE lighting systems.

Informational Note No. 6: Rated current for power sources covered in 725.144 is the output current per conductor the power source is designed to deliver to an operational load at normal operating conditions, as declared by the manufacturer. In the design of these systems, the actual current in a given conductor might vary from the rated current per conductor by as much as 20 percent. An increase in current in one conductor is offset by a corresponding decrease in current in one or more conductors of the same cable.

(A) Use of Class 2 or Class 3 Cables to Transmit Power and Data.

Where Types CL3P, CL2P, CL3R, CL2R, CL3, or CL2 transmit power and data, the rated current per conductor of the power source shall not exceed the ampacities in Table 725.144 at an ambient temperature of 30°C (86°F). For ambient temperatures above 30°C (86°F), the correction factors in Table 310.15(B)(1) or in Equation 310.15(B) shall apply.

Exception: Compliance with Table 725.144 shall not be required for installations where conductors are 24 AWG or larger and the rated current per conductor of the power source does not exceed 0.3 amperes.

Informational Note: One example of the use of Class 2 cables is a network of closed-circuit TV cameras using 24 AWG, 60°C rated, Type CL2R, Category 5e balanced twisted-pair cabling.

(B) Use of Class 2-LP or Class 3-LP Cables to Transmit Power and Data.

Types CL3P-LP, CL2P-LP, CL3R-LP, CL2R-LP, CL3-LP, or CL2-LP shall be permitted to supply power to equipment from a power source with a rated current per conductor up to the marked current limit located immediately following the suffix "-LP" and shall be permitted to transmit data to the equipment. Where the number of bundled LP cables is 192 or less and the selected ampacity of the cables in accordance with Table 725.144 exceeds the marked current limit of the cable, the ampacity determined from the table shall be permitted to be used. For ambient temperatures above 30°C (86°F), the correction factors of Table 310.15(B)(1) or Equation 310.15(B) shall apply. The Class 2-LP and Class 3-LP cables shall comply with the following, as applicable:

- (1) Cables with the suffix "-LP" shall be permitted to be installed in bundles, raceways, cable trays, communications raceways, and cable routing assemblies.
- (2) Cables with the suffix "-LP" and a marked current limit shall follow the substitution hierarchy of Table 725.154 and Figure 725.154(A) for the cable type without the suffix "-LP" and without the marked current limit.
- (3) System design shall be permitted by qualified persons under engineering supervision.

Informational Note: An example of the marking on a 23 AWG, 4-pair, Class 2 cable rated 75 °C with an LP current rating of 0.6 amperes per conductor is "CL2-LP(0.6A) 75 °C 23 AWG 4-pair. See 725.179(I)

~~offset by a corresponding decrease in current in one or more conductors of the same cable.~~

Table 725.144 Ampacities of Each Conductor in Amperes in 4-Pair Class 2 or Class 3 Balanced Twisted-Pair Cables Based on Copper Conductors at an Ambient Temperature of 30°C (86°F) with All Conductors in All Cables Carrying Current, 60°C (140°F), 75°C (167°F), and 90°C (194°F) Rated Cables

AWG	Number of 4-Pair Cables in a Bundle																	
	1–7			8–19			20–37			38–61			62–91			92–192		
	Temperature Rating			Temperature Rating			Temperature Rating			Temperature Rating			Temperature Rating			Temperature Rating		
	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C
26	1.00	1.23	1.42	0.71	0.87	1.02	0.55	0.68	0.78	0.46	0.57	0.67	0.45	0.55	0.64	NA	NA	NA
24	1.19	1.46	1.69	0.81	1.01	1.17	0.63	0.78	0.91	0.55	0.67	0.78	0.46	0.56	0.65	0.40	0.48	0.55

AWG	Number of 4-Pair Cables in a Bundle																	
	1–7			8–19			20–37			38–61			62–91			92–192		
	Temperature Rating			Temperature Rating			Temperature Rating			Temperature Rating			Temperature Rating			Temperature Rating		
	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C
23	1.24	1.53	1.78	0.89	1.11	1.28	0.77	0.95	1.10	0.66	0.80	0.93	0.58	0.71	0.82	0.45	0.55	0.63
22	1.50	1.86	2.16	1.04	1.28	1.49	0.77	0.95	1.11	0.66	0.82	0.96	0.62	0.77	0.89	0.53	0.63	0.72

Note 1: For bundle sizes over 192 cables, or for conductor sizes smaller than 26 AWG, ampacities shall be permitted to be determined by qualified personnel under engineering supervision.

Note 2: Where only half of the conductors in each cable are carrying current, the values in the table shall be permitted to be increased by a factor of 1.4.

Informational Note No. 1: Elevated cable temperatures can reduce a cable's data transmission performance. For information on practices for 4-pair balanced twisted pair cabling, see TIA-TSB-184-A and 6.4.7, 6.6.3, and Annex G of ANSI/TIA-568-C.2, which provide guidance on adjustments for operating temperatures between 20°C and 60°C.

Informational Note No. 2: The per-contact current rating of connectors can limit the maximum allowable current below the ampacity shown in Table 725.144.

~~(A) Use of Class 2 or Class 3 Cables to Transmit Power and Data:~~

~~Where Types CL3P, CL2P, CL3R, CL2R, CL3, or CL2 transmit power and data, the rated current per conductor of the power source shall not exceed the ampacities in Table 725.144 at an ambient temperature of 30°C (86°F). For ambient temperatures above 30°C (86°F), the correction factors in Table 310.15(B)(1) or in Equation 310.15(B) shall apply.~~

~~Exception: Compliance with Table 725.144 shall not be required for installations where conductors are 24 AWG or larger and the rated current per conductor of the power source does not exceed 0.3 amperes.~~

~~Informational Note: One example of the use of Class 2 cables is a network of closed-circuit TV cameras using 24 AWG, 60°C rated, Type CL2R, Category 5e balanced twisted pair cabling.~~

~~(B) Use of Class 2 LP or Class 3 LP Cables to Transmit Power and Data:~~

~~Types CL3P-LP, CL2P-LP, CL3R-LP, CL2R-LP, CL3-LP, or CL2-LP shall be permitted to supply power to equipment from a power source with a rated current per conductor up to the marked current limit located immediately following the suffix "LP" and shall be permitted to transmit data to the equipment. Where the number of bundled LP cables is 192 or less and the selected ampacity of the cables in accordance with Table 725.144 exceeds the marked current limit of the cable, the ampacity determined from the table shall be permitted to be used. For ambient temperatures above 30°C (86°F), the correction factors of Table 310.15(B)(1) or Equation 310.15(B) shall apply. The Class 2 LP and Class 3 LP cables shall comply with the following, as applicable:~~

- ~~(1) Cables with the suffix "LP" shall be permitted to be installed in bundles, raceways, cable trays, communications raceways, and cable routing assemblies.~~
- ~~(2) Cables with the suffix "LP" and a marked current limit shall follow the substitution hierarchy of Table 725.154 and Figure 725.154(A) for the cable type without the suffix "LP" and without the marked current limit.~~
- ~~(3) System design shall be permitted by qualified persons under engineering supervision.~~

~~Informational Note: An example of the marking on a 23 AWG, 4-pair, Class 2 cable rated 75 °C with an LP current rating of 0.6 amperes per conductor is "CL2-LP(0.6A) 75 °C AWG 4-pair. See 725.179(I).~~

Informational Note: An example of a limited power (LP) cable is a cable marked Type CL2-LP(0.5A), 23 AWG.

Part IV. Listing Requirements

725.170 Listing and Marking of Equipment for Power and Data Transmission. The listed power source for circuits intended to provide power and data over Class 2 cables to remote equipment shall be as specified in 725.121(A)(1), (A)(2), (A)(3), or (A)(4). In accordance with 725.121(B), the power sources shall not have the output connections paralleled or otherwise interconnected, unless listed for such interconnection. Powered devices connected to a circuit supplying data and power shall be listed. Marking of equipment output connections shall be in accordance with 725.121(C).

725.179 Listing and Marking of Limited Power (LP) Cables.

Limited power (LP) cables shall be listed as suitable for carrying power and data up to a specified current limit for each conductor without exceeding the temperature rating of the cable. The cables shall be marked with the suffix "LP (XXA)" where XXA designates the current limit in amperes per conductor.
Informational Note: An example of the marking on a 23 AWG, 4-pair, Class 2 cable rated 75°C with an LP current rating of 0.6 amperes per conductor is "CL2-LP(0.6A) 75°C 23 AWG 4-pair".

**First Revision No. 9606-NFPA 70-2021 [Global Input]**

See attached Word file for New Article 726, Class 4 (CL4) Power Systems.

Supplemental Information

<u>File Name</u>	<u>Description</u> <u>Approved</u>
ART_726_Class_4_Power_Systems_CLEAN.docx	For staff use
NEC_Global_FR-9606_Article_726_NEW_for_ballot.pdf	For ballot

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Wed Jan 27 16:37:03 EST 2021

Committee Statement

Committee Statement: This First Revision creates a new Article 726 for Class 4 Power Systems. The panel proposes that this new Article should follow Article 725 and be numbered 726.

The proposed new article also includes a new cable type specifically for Class 4 systems.

Class 4 is different than Class 2 or Class 3 power limited circuits. Section 725.121(A)(4) indicates that listed equipment with a limited power source (LPS) output can be considered a Class 2 circuit. UL 62368-1 requires the output of a limited power source (LPS) to be power limited. These Class 4 systems do not limit the output of the power source but rather the systems limit the energy and power available into a fault condition, including human contact, arcing and resistive faults. If monitored and controlled correctly, Class 4 can be as safe or safer than an LPS, but because they are fault-limiting rather than source-limiting, these systems need to be treated differently in the NEC and in product standards. In Class 4 circuits, risks are mitigated by limiting exposure times (short pulses or fast shut-off times) and eliminating repetitive impulses. In addition, they rely on sophisticated monitoring and control systems to mitigate the risks rather than traditional mechanical protection allowing for cabling systems and installations that are more like Class 2 and Class 3 circuits than power and lighting circuits. These monitoring and control safety systems involve solid state controls, microprocessors, firmware and software elements that will require fault analysis, critical software testing and general functional safety evaluations.

The Class 4 Power System is a fault-managed system that relies on an electronic handshake to verify that the powered device is present and operating correctly before greater than Class 2 power is applied. Faults result in immediate termination of output power. Digital monitoring is not a new concept or unique to these systems to control and mitigate safety risks. There are a number of standards that rely on "digital" monitoring and controls in very critical safety areas, including but not limited to patient care equipment, electronic programmable circuit breakers and alarm systems. The necessary requirements for functional safety, including mean time between failures of critical components, software reliability and the like are well known. However, the complexity and applications of this technology warrant the development of new installation code requirements.

Unlike Class 2 circuits which place finite limits for sinusoidal ac and dc voltages to reduce the risk of electric shock, Class 4 circuits need to consider voltage levels, pulse widths, repetitive pulses, time to shut-off, and stored charge from cable capacitance and equipment. This is not something an installer or an AHJ can do in the field. There will have to be a reliance on the safety standards and the listing of equipment.

Response Message: FR-9606-NFPA 70-2021

[Public Input No. 3740-NFPA 70-2020 \[New Article after 725\]](#)

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Iverson, Donald R.

Schneider Electric supports this First Revision for Class 4 Power Systems. The product safety standard for Class 4 power supplies is currently under development and the installation requirements introduced in this new article are extensively dependent on the completion of the anticipated safety standard. The safety standard must be completed to introduce this article in the NEC. We do recommend the following changes to improve the new section: 726.1 – The scope should read “This article covers the use in other than dwellings, the installation of wiring and equipment of fault managed power (FMP) systems...” No requirements on equipment interoperability, cord/plug connectivity, or other residential hazards are addressed in this new article. Without more details on how the installation could be made safely and without potential interoperability issues in a residential environment, dwellings should not be included. 726.124 (A) - Class 4 Transmitter markings should include the maximum power not just maximum voltage and current output. The inclusion of this information will allow for easier inspection and application. 726.124 (B) - Class 4 Receiver markings should include the maximum power output not just voltage and current output. The inclusion of this information will allow for easier inspection and application. Section

726.335 (K) should be removed since it specifies use in multifamily dwellings. Other than dwelling reasoning is detailed in suggested change #1. Section 726.335(L) should be removed since it specifies use in One- and Two-Family Dwellings. Other than dwelling reasoning is detailed in suggested change #1.

Tellas, Ronald

agreed.

Article 726 Class 4 (CL4) Power Systems

Part I. General

726.1 Scope.

This article covers the installation of wiring and equipment of fault-managed power (FMP) systems, including utilization equipment incorporating parts of these systems.

Informational Note No. 1: See Article 100 for definitions related to this section.

Informational Note No. 2: Class 4 power systems consist of a Class 4 power transmitter and a Class 4 power receiver connected by a cabling system. These systems are characterized by monitoring the circuit for faults and controlling the power transmitted to ensure the energy and power delivered into any fault is limited. Class 4 systems differ from Class 1, Class 2, and Class 3 systems in that they are not limited for power delivered to an appropriate load. They are power limited with respect to risk of shock and fire between the Class 4 transmitter and Class 4 receiver.

Informational Note No. 3: The circuits described in this article are characterized by monitoring and control systems that differentiate them from electric light and power circuits; therefore, alternative requirements to those of Chapters 1 through 4 are given regarding minimum wire sizes, ampacity adjustment and correction factors, overcurrent protection, insulation requirements, and wiring methods and materials.

Part II. Class 4 Circuits

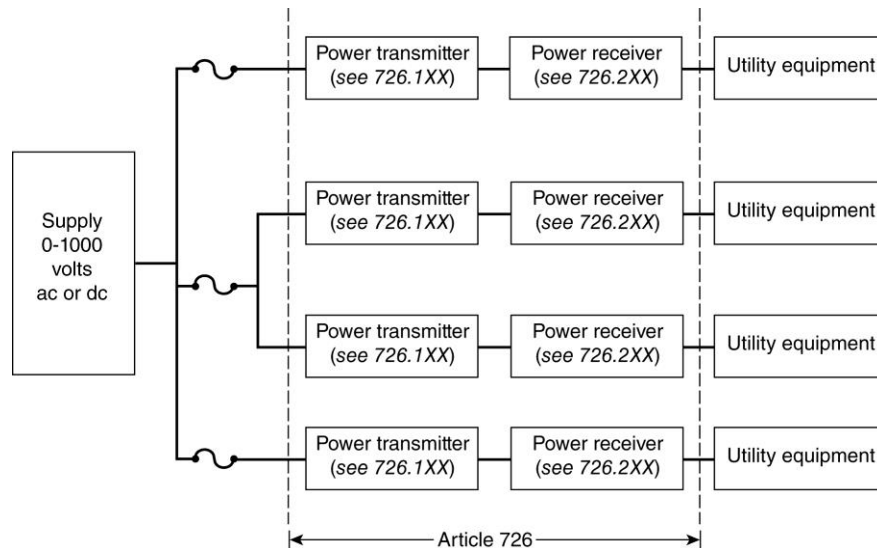
726.121 Power Sources for Class 4 Circuits.

The power source shall be a listed Class 4 power transmitter or listed Class 4 power transmitter/receiver system and shall provide the protections in accordance with 726.121(A) and (B). Class 4 circuits shall be supplied from a power source (transmitter) that has a peak voltage output of not more than 450 volts dc line to line or 225 volts dc line to ground.

Informational Note No. 1: Informational Note Figure 726.121 illustrates the relationships between Class 4 power transmitters (power sources), Class 4 power transmitters (power sources) supplies, Class 4 circuits, Class 4 power receivers, and utilization equipment.

Informational Note No. 2: See UL ###-1, *Standard for Class 4 Power Systems*, for information on determining applicable requirements for the listing of Class 4 power systems.

Figure Informational Note Figure 726.121 Class 4 Circuits.



(A) Fault Energy and Power Limitations.

For listing purposes, under the conditions specified in 726.121(B), the energy available into a fault shall be limited according to the requirements of the following:

- (1) A Class 4 power source shall provide protection of personnel against the risk of electric shock by de-energizing the circuit or a portion thereof, or limiting the current, within an established period of time.

Informational Note No. 1: This time requirement provides an equivalent level of protection from electric shock as Class 2 circuits.

- (2) The maximum power that can be delivered into a fault between conductors or between any conductor and ground shall not exceed 100 volt-amperes, measured after 5 seconds.

Informational Note No. 2: This requirement reduces the risk of fire due to resistive heating.

- (3) A Class 4 power source shall 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.

Informational Note No. 3: This requirement reduces the risk of fire due to arcing.

(B) Fault Management.

A listed transmitter shall interrupt an energized circuit within the limits of 726.121(A) when any of the following conditions occur:

- (1) An abnormal condition such as abnormal voltage, current, waveform, or load condition is identified in the system
- (2) A short circuit occurs
- (3) Human skin contacts energized parts
- (4) A ground-fault condition exists

(5) An overcurrent condition exists

(6) Intentional shorting of the line at the receiving or transmitting end to force de-energization for purposes of maintenance or repair occurs

(7) A malfunction of the monitoring or control system occurs

726.122 Class 4 Loads.

Outputs of a Class 4 receiver and power outputs of Class 4 utilization equipment shall be considered a separately derived system and shall be subject to requirements in Chapters 1 through 4.

Informational Note: Class 4 utilization equipment that does not provide power outputs is not subject to these requirements.

Exception: A Class 4 receiver with limited-power circuit outputs shall be permitted to meet the requirements of Parts I thru IV of Article 725.

726.124 Class 4 Marking.

(A) Class 4 Transmitter Marking.

The equipment supplying the Class 4 circuits shall be durably marked where plainly visible to indicate each circuit that is a Class 4 circuit. The marking shall also include the maximum voltage and current output for each connection point. Where multiple connection points have the same rating, a single label shall be permitted to be used.

Informational Note: An example of marking is "Class 4: +/-190V, 5A" for a Class 4 transmitter capable of delivering 1.9 kW from 380 volts line to line.

(B) Class 4 Receiver Marking.

A Class 4 receiver or Class 4 utilization equipment shall be durably marked where plainly visible to indicate each circuit that is a Class 4 circuit. The marking shall also include the maximum input voltage and current for each connection point. Where the Class 4 receiver or Class 4 utilization equipment has user-accessible outputs, each output shall be durably marked where plainly visible. The marking shall also include the maximum output voltage and current for each connection point. Where multiple connection points have the same rating, a single label shall be permitted to be used.

Part III. Listing Requirements

726.170 Listing of Equipment for Class 4 Systems.

The active components of a Class 4 system shall be listed as a Class 4 device. The Class 4 transmitter and Class 4 receiver combination or Class 4 transmitter and Class 4 utilization equipment combination shall be listed as a system to confirm interoperability.

Informational Note: See UL ###-1, *Standard for Class 4 Power Systems*, for information on determining applicable requirements for the listing of Class 4 power systems.

Part IV. Installation

726.203 Other Articles.

In addition to the requirements of this article, circuits and equipment shall comply with the requirements in 726.3(A) through (N). Only those sections of Article 300 referenced in this article shall apply to Class 4 power systems.

(A) Number and Size of Conductors in Raceway.

The number and size of conductors shall comply with the requirements of 300.17.

(B) Spread of Fire or Products of Combustion.

Installation of Class 4 circuits shall comply with the requirements of 300.21.

(C) Ducts, Plenums, and Other Air-Handling Spaces.

Class 4 circuits installed in ducts, plenums, and other spaces used for environmental air shall comply with the requirements of 300.22.

(D) Cable Trays.

Cable tray installations shall comply with the requirements of Parts I and II of Article 392.

(E) Instrumentation Tray Cable.

Instrumentation tray cable (Type ITC) installations shall comply with the requirements of 727.1 and 727.4 through 727.9.

(F) Raceways Exposed to Different Temperatures.

Installations shall comply with the requirements of 300.7(A).

(G) Bushing.

Bushings shall be installed where cables emerge from raceways used for mechanical support or protection in accordance with 300.15(C).

(H) Installation of Conductors With Other Systems.

Installation of conductors with other systems shall comply with the requirements of 300.8.

(I) Corrosive, Damp, or Wet Locations.

Class 4 cables installed in corrosive, damp, or wet locations shall comply with the applicable requirements of 110.11, 300.5(B), 300.6, 300.9, and 310.10(F).

(J) Cable Routing Assemblies.

Class 4 and Type CL4TC cables shall be permitted to be installed in plenum cable routing assemblies, riser cable routing assemblies, and general-purpose cable routing assemblies selected in accordance with Table 800.154(c), listed in accordance with 800.182, and installed in accordance with 800.110(C) and 800.113.

(K) Communications Raceways.

Where the requirements applicable to electrical nonmetallic tubing (ENT) apply, Class 4 and Type CL4TC cables shall be permitted to be installed in plenum communications raceways, riser communications raceways, and general-purpose communications raceways selected in accordance with Table 800.154(b), listed in accordance with 800.182, and installed in accordance with 800.113 and 362.24 through 362.56.

(L) Temperature Limitation of Class 4 Cables.

The requirements of 310.14(A)(3) on the temperature limitation of conductors shall apply to Class 4 cables.

(M) Identification of Equipment Grounding Conductors.

Equipment grounding conductors shall be identified in accordance with 250.119.

Exception: Class 4 cables that do not contain an equipment grounding conductor shall be permitted to use a conductor with green or green with one or more yellow stripes insulation for other than equipment grounding purposes.

726.212 Uses Not Permitted.

(A) Hazardous (Classified) Locations.

Cables shall not be installed in any hazardous (classified) location, except as permitted by other articles of this Code.

Informational Note: Hazardous locations are covered in Articles 500 through 516 and in Part IV of Article 517.

(B) Other Applications.

Class 4 cables shall not be permitted for any applications that are not part of a Class 4 distribution system.

Exception: Use of CL4 cable for other applications shall be permitted if the cable has multiple listings.

726.221 Access to Electrical Equipment Behind Panels Designed to Allow Access.

Access to electrical equipment shall not be denied by an accumulation of wires and cables preventing the removal of panels, including suspended ceiling panels.

726.224 Mechanical Execution of Work.

CL4 cables shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed on the surfaces of ceilings and sidewalls shall be supported by the building structure such that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, hangers, cable ties, or similar fittings that are designed and installed to not damage the cable. The installation shall also comply with the requirements of 300.4 and 300.11.

Informational Note: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants can result in an undetermined alteration of CL4 cable properties.

726.225 Abandoned Cables.

The accessible portion of abandoned Class 4 and CL4TC cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved.

726.228 Noninterchangeability.

Receptacles, cord connectors, and attachment plugs used on Class 4 distribution systems shall be constructed so that they are not interchangeable with other receptacles, cord connectors, and attachment plugs.

726.233 Guarding.

Any junctions and mating connectors shall be constructed and installed to guard against inadvertent contact with live parts by persons.

726.335 Installation of CL4 Cables.

Installation of CL4 and CL4TC cables shall comply with the requirements of 726.135(A) through (L) and shall be listed for the application.

(A) Ducts Specifically Fabricated for Environmental Air.

The following cables shall be permitted in ducts specifically fabricated for environmental air as described in 300.22(B) if directly associated with the air distribution system:

- (1) Type CL4 cables in lengths as short as practicable to perform the required function
- (2) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables installed in raceways that are installed in compliance with 300.22(B)

Informational Note: See 4.3.4.1 and 4.3.11.3.3 of NFPA 90A-2018, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, for information on fire protection of wiring installed in fabricated ducts.

(B) Other Spaces Used for Environmental Air (Plenums).

The following cables shall be permitted in other spaces used for environmental air as described in 300.22(C):

- (1) Type CL4P cables
- (2) Type CL4P cables installed in plenum communications raceways
- (3) Type CL4P cables installed in plenum cable routing assemblies
- (4) Type CL4P cables and plenum communications raceways supported by open metallic cable trays or cable tray systems
- (5) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables installed in raceways that are installed in compliance with 300.22(C)
- (6) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables supported by solid bottom metal cable trays with solid metal covers in other spaces used for environmental air (plenums) as described in 300.22(C)
- (7) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables installed in plenum communications raceways, riser communications raceways, and general-purpose communications raceways supported by solid bottom metal cable trays with solid metal covers in other spaces used for environmental air (plenums) as described in 300.22(C)

(C) Risers — Cables in Vertical Runs.

The following cables shall be permitted in vertical runs penetrating one or more floors and in vertical runs in a shaft:

- (1) Type CL4R and Type CL4P cables
- (2) Type CL4R and Type CL4P cables installed in the following:
 - (a) Plenum communications raceways

(b) Plenum cable routing assemblies

(c) Riser communications raceways

(d) Riser cable routing assemblies

Informational Note: See 300.21 for firestop requirements for floor penetrations.

(D) Risers — Cables and Innerducts in Metal Raceways.

The following cables shall be permitted in metal raceways in a riser having firestops at each floor:

(1) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables

(2) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables installed in the following:

(a) Plenum communications raceways (innerduct)

(b) Riser communications raceways (innerduct)

(c) General-purpose communications raceways (innerduct)

Informational Note: See 300.21 for firestop requirements for floor penetrations.

(E) Risers — Cables in Fireproof Shafts.

The following shall be permitted to be installed in fireproof riser shafts having firestops at each floor:

(1) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables

(2) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables installed in the following:

(a) Plenum communications raceways

(b) Plenum cable routing assemblies

(c) Riser communications raceways

(d) Riser cable routing assemblies

(e) General-purpose communications raceways

(f) General-purpose cable routing assemblies

Informational Note: See 300.21 for firestop requirements for floor penetrations.

(F) Risers — One- and Two-Family Dwellings.

The following cables shall be permitted in one- and two-family dwellings:

(1) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables

(2) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables installed in the following:

(a) Plenum communications raceways

- (b) Plenum cable routing assemblies
- (c) Riser communications raceways
- (d) Riser cable routing assemblies
- (e) General-purpose communications raceways
- (f) General-purpose cable routing assemblies

(G) Cable Trays.

Cables installed in cable trays outdoors shall be Type CL4TC. The following cables shall be permitted to be supported by cable trays in buildings:

- (1) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables
- (2) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables installed in the following:
 - (a) Plenum communications raceways
 - (b) Riser communications raceways
 - (c) General-purpose communications raceways

(H) Cross-Connect Arrays.

The following cables shall be permitted to be installed in cross-connect arrays:

- (1) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables
- (2) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables installed in the following:
 - (a) Plenum communications raceways
 - (b) Plenum cable routing assemblies
 - (c) Riser communications raceways
 - (d) Riser cable routing assemblies
 - (e) General-purpose communications raceways
 - (f) General-purpose cable routing assemblies

(I) Industrial Establishments.

In industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation, Type CL4TC cables shall be permitted in accordance with either 726.335(I)(1) or (I)(2).

(1) Type CL4 TC-ER.

Where the cable is not subject to physical damage, Type CL4TC cable that complies with the crush and impact requirements of Type MC cable and is identified as Type CL4TC-ER for such use shall be permitted to be exposed between the cable tray and the Class 4 receiver or Class 4 utilization equipment. The cable shall be continuously supported and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be supported and secured at intervals not exceeding 1.8 m (6 ft). Where not subject to physical damage, Type

CL4TC-ER cable shall be permitted to transition between cable trays and between cable trays and the Class 4 receiver or Class 4 utilization equipment for a distance not to exceed 1.8 m (6 ft) without continuous support. The cable shall be mechanically supported where exiting the cable tray to ensure that the minimum bending radius is not exceeded.

(2) Type CL4 TC.

Type CL4TC cable, with a metallic sheath or armor in accordance with 725.179(E), shall be permitted to be installed exposed. The cable shall be continuously supported and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be secured at intervals not exceeding 1.8 m (6 ft).

(J) Other Building Locations.

The following cables shall be permitted to be installed in building locations other than those covered in 726.135(B) through (I):

- (1) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables
- (2) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables installed in the following:
 - (a) Plenum communications raceways
 - (b) Plenum cable routing assemblies
 - (c) Riser communications raceways
 - (d) Riser cable routing assemblies
 - (e) General-purpose communications raceways
 - (f) General-purpose cable routing assemblies
- (3) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables installed in raceways recognized in Chapter 3

(K) Multifamily Dwellings.

The following cables shall be permitted to be installed in multifamily dwellings in locations other than those covered in 726.135(B) through (I):

- (1) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables
- (2) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables installed in the following:
 - (a) Plenum communications raceways
 - (b) Plenum cable routing assemblies
 - (c) Riser communications raceways
 - (d) Riser cable routing assemblies
 - (e) General-purpose communications raceways
 - (f) General-purpose cable routing assemblies

- (3) Type CL4, Type CL4R, Type CL4P, and Type CL4TC wires and cables installed in raceways recognized in Chapter 3

(L) One- and Two-Family Dwellings.

The following cables shall be permitted to be installed in one- and two-family dwellings in locations other than those covered in 726.135(B) through (I):

- (1) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables
- (2) Types Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables installed in the following:
- (a) Plenum communications raceways
 - (b) Plenum cable routing assemblies
 - (c) Riser communications raceways
 - (d) Riser cable routing assemblies
 - (e) General-purpose communications raceways
 - (f) General-purpose cable routing assemblies
- (3) Type CL4, Type CL4R, Type CL4P, and Type CL4TC cables installed in raceways recognized in Chapter 3

726.336 Separation from Electric Light, Power, Class 1, Non-Power-Limited Fire Alarm Circuit, and Medium-Power Network-Powered Broadband Communications Cables.

(A) General.

Cables and conductors of CL4 circuits shall not be placed in any cable, cable tray, compartment, enclosure, manhole, outlet box, device box, raceway, or similar fitting with conductors of electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits unless permitted by 726.136(B) through (I).

(B) Separated by Barriers.

Class 4 circuits shall be permitted to be installed together with the conductors of electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits where they are separated by a barrier.

(C) Raceways Within Enclosures.

In enclosures, Class 4 circuits shall be permitted to be installed in a raceway to separate them from Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits.

(D) Associated Systems Within Enclosures.

Class 4 circuit conductors in compartments, enclosures, device boxes, outlet boxes, or similar fittings shall be permitted to be installed with electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits where they are introduced solely to connect the equipment connected to Class 4 circuits, and where either of the following applies:

- (1) The electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuit conductors are routed to maintain a minimum of 6 mm (0.25 in.) separation from the conductors and cables of Class 4 circuits.
- (2) The non-Class 4 circuit conductors operate at 150 volts or less to ground and the Class 4 circuits are installed using Type CL4, Type CL4R, or Type CL4P cables if any CL4 cable conductors extending beyond the jacket are separated by a minimum of 6 mm (0.25 in.) or by a nonconductive sleeve or nonconductive barrier from all other conductors.

(E) Enclosures with Single Openings.

Class 4 circuit conductors entering compartments, enclosures, device boxes, outlet boxes, or similar fittings shall be permitted to be installed with Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits where they are introduced solely to connect the equipment connected to Class 4 circuits. Where Class 4 circuit conductors must enter an enclosure that is provided with a single opening, they shall be permitted to enter through a single fitting (such as a tee) if the conductors are separated from the conductors of the other circuits by a continuous and firmly fixed nonconductor, such as flexible tubing.

(F) Manholes.

Underground Class 4 circuit conductors in a manhole shall be permitted to be installed with Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits where one of the following conditions is met:

- (1) The electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuit conductors are in a metal-enclosed cable or Type UF cable.
- (2) The Class 4 circuit conductors are permanently and effectively separated from the conductors of other circuits by a continuous and firmly fixed nonconductor, such as flexible tubing, in addition to the insulation or covering on the wire.
- (3) The Class 4 circuit conductors are permanently and effectively separated from conductors of the other circuits and securely fastened to racks, insulators, or other approved supports.

(G) Cable Trays.

Class 4 circuit conductors shall be permitted to be installed in cable trays where the conductors of the electric light, Class 1, and non-power-limited fire alarm circuits are separated by a solid fixed barrier of a material compatible with the cable tray or where the Class 4 circuits are installed in Type MC cable.

(H) In Hoistways.

In hoistways, Class 4 circuit conductors shall be installed in rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, liquidtight flexible nonmetallic conduit, or electrical metallic tubing. For elevators or similar equipment, these conductors shall be permitted to be installed in accordance with 620.21.

(I) Other Applications.

For other applications, conductors of Class 4 circuits shall be separated by at least 50 mm (2 in.) from conductors of any electric light, power, Class 1, non-power-limited fire alarm, or medium-power network-powered broadband communications circuits unless one of the following conditions is met:

- (1) Either all of the electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuit conductors or all of the Class 4 circuit conductors are in a raceway or in metal-sheathed, metal-clad, non-metallic-sheathed, Type TC, or Type UF cables
- (2) All of the electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuit conductors are permanently separated from all of the Class 4 circuit conductors by a continuous and firmly fixed nonconductor, such as porcelain tubes or flexible tubing, in addition to the insulation on the conductors

726.339 Installation of Conductors of Different Circuits in the Same Cable, Enclosure, Cable Tray, Raceway, or Cable Routing Assembly.

(A) Two or More Class 4 Circuits.

Conductors of two or more Class 4 circuits shall be permitted within the same cable, enclosure, raceway, or cable routing assembly.

(B) Class 4 Circuits With Class 2, Class 3, or Communications Circuits.

Conductors of one or more Class 4 circuits shall be permitted within the same cable, enclosure, raceway, or cable routing assembly as conductors of Class 2, Class 3, or communications circuits if the insulation of the Class 2, Class 3, or communications circuit conductors in the cable, enclosure, raceway, or cable routing assembly is at least that required for Class 4 circuits.

(C) Class 4 Cables With Other Circuit Cables.

Jacketed cables of Class 4 circuits shall be permitted in the same enclosure, cable tray, raceway, or cable routing assembly with jacketed cables of any of the following:

- (1) Power-limited fire alarm systems in compliance with Parts I and III of Article 760
- (2) Nonconductive and conductive optical fiber cables in compliance with Parts I and IV of Article 770
- (3) Communications circuits in compliance with Parts I and IV of Article 805
- (4) Community antenna television and radio distribution systems in compliance with Parts I and IV of Article 820
- (5) Low-power, network-powered broadband communications in compliance with Parts I and IV of Article 830

726.341 Installation of Circuit Conductors Extending Beyond One Building.

Where Class 4 circuit conductors extend beyond one building and are run such that they are subject to accidental contact with electric light or power conductors

operating over 300 volts to ground, or are exposed to lightning on interbuilding circuits on the same premises, the requirements of the following shall also apply:

- (1) Sections 800.44, 800.53, 800.100, 805.50, 805.93, and 805.170(A) and (B) for other than coaxial conductors
- (2) Sections 820.44, 820.93, and 820.100 for coaxial conductors

726.343 Support of Conductors.

Class 4 circuit conductors shall not be strapped, taped, or attached by any means to the exterior of any conduit or other raceway as a means of support. These conductors shall be permitted to be installed as permitted by 300.11(C)(2).

726.379 Listing and Marking of Class 4 Cables.

Cables for Class 4 power systems shall be Type CL4, Type CL4R, or Type CL4P and shall be listed for Class 4 distribution system use. CL4 cables installed as wiring methods within buildings shall be listed as resistant to the spread of fire and other criteria in accordance with 726.179(A) through (D), shall be constructed in accordance with 726.179(E), shall be marked in accordance with 726.179(F), and shall be permitted to be marked in accordance with 726.179(G).

Informational Note: See UL ###-2, *Standard for Class 4 Power Systems*, for information on determining applicable requirements for the listing of Class 4 power systems.

(A) Type CL4P.

Type CL4P plenum cable shall be marked as Type CL4P and shall be listed as suitable for use in ducts, plenums, and other spaces for environmental air and shall be listed as having adequate fire-resistant and low-smoke producing characteristics.

Informational Note: One method of defining a cable that is low-smoke producing and fire resistant is that the cable exhibits a maximum peak optical density of 0.50 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262-2019, *Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces*.

(B) Type CL4R.

Type CL4R riser cable shall be marked as Type CL4R and be listed as suitable for use in a vertical run in a shaft or from floor to floor and shall be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.

Informational Note: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-2012, *Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts*.

(C) Type CL4.

Type CL4 cables shall be marked as Type CL4 and be listed as suitable for general-purpose use, with the exception of risers, ducts, plenums, and other spaces used for environmental air, and shall be listed as resistant to the spread of fire.

Informational Note No. 1: One method of defining *resistant to the spread of fire* is that the cables do not spread fire to the top of the tray in the UL flame

exposure, vertical tray flame test in ANSI/UL 1685-2010, Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Informational Note No. 2: Another method of defining *resistant to the spread of fire* is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA vertical flame test for cables in cable trays, as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

(D) Type CL4TC.

Type CL4TC nonmetallic-sheathed tray cable shall be marked as Type CL4TC, shall be listed as being suitable for cable trays, and shall consist of a factory assembly of two or more insulated conductors under a nonmetallic jacket. The insulated conductors shall be at least 24 AWG copper (solid or stranded). Insulation on conductors shall be rated for 450 volts dc. The cable core shall be two or more parallel conductors, one or more group assemblies of twisted or parallel conductors, or a combination of both. A metallic shield or a metallized foil shield with drain wire(s) shall be permitted to be applied over the cable core, over groups of conductors, or both. The cable shall be listed as resistant to the spread of fire. The outer jacket shall be a sunlight- and moisture-resistant nonmetallic material. Type CL4TC cable used in a wet location shall be listed for use in wet locations or have a moisture-impervious metal sheath.

Exception: Where a smooth metallic sheath, continuous corrugated metallic sheath, or nonmetallic jacket with interlocking tape armor is provided, an overall nonmetallic jacket shall not be required. On metallic-sheathed cable without an overall nonmetallic jacket, the information required in 310.8 shall be located on the nonmetallic jacket under the sheath.

Informational Note No. 1: One method of defining *resistant to the spread of fire* is that the cables do not spread fire to the top of the tray in the UL flame exposure, vertical tray flame test in ANSI/UL 1685-2010, Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Informational Note No. 2: Another method of defining *resistant to the spread of fire* is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA vertical tray flame test for cables in cable trays, as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

(E) Cable Construction.

(1) Sizes.

Conductors of sizes not smaller than 24 AWG shall be permitted to be used.

(2) Insulation.

Insulation on conductors shall be rated not less than 450 volts dc.

(3) Voltage Rating.

Cables shall have a voltage rating of not less than 450 volts dc. Voltage ratings shall not be marked on the cables.

(4) Temperature Rating.

Cables shall have a temperature rating of not less than 60°C (140°F).

(5) Cabling.

Cables shall comply with any requirements provided in the listing of the system.

Informational Note: Excessive cable lengths can result in higher capacitance which could affect the safety of the circuit. See UL ###-2, *Standard for Class 4 Power Systems*, for information on determining applicable requirements for the listing of Class 4 power systems.

(F) Marking.

All cables shall be marked to indicate the following information using the applicable method described in 310.8(B):

- (1) The cable type as described in 726.179 (A) through (D)
- (2) The manufacturer's name, trademark, or other distinctive marking by which the organization responsible for the product can be readily identified
- (3) The AWG size or circular mil area
- (4) Number of conductors, if more than two
- (5) The temperature rating of Class 4 cables that have a rating exceeding 60°C (140°F)

(G) Optional Markings.

Cables shall be permitted to be surface marked to indicate special characteristics of the cable materials.

Informational Note No. 1: These markings include, but are not limited to, markings for limited smoke, halogen free, low smoke and halogen free, and sunlight resistant.

Informational Note No. 2: Some examples of optional markings are "ST1" to indicate limited-smoke characteristics in accordance with UL 2556, *Wire and Cable Test Methods*; "HF" to indicate halogen-free as described in UL 2885, *Outline of Investigation for Acid Gas, Acidity and Conductivity of Combusted Materials and Assessment of Halogens*; and "LSHF" to indicate halogen-free and low-smoke characteristics in accordance with IEC 61034-2, *Measurement of smoke density of cables burning under defined conditions — Part 2: Test procedure and requirements*.

**First Revision No. 9609-NFPA 70-2021 [Global Input]**

See Attached Word Document for Changes Restructure Article 300 and new Article 305 to better align requirements, improve consistency in approach, improve usability, and increase focus on higher voltage applications.

Supplemental Information

<u>File Name</u>	<u>Description</u> <u>Approved</u>
Chapter_3_MV_Restructuring_FINAL_9609.docx	For staff use
NEC_Global_FR-9609_Articles_300_and_305_For_ballot.pdf	For ballot

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Wed Jan 27 18:14:24 EST 2021

Committee Statement

Committee Statement: No new requirements have been added with this revision. The existing language has been realigned. Organizing Medium Voltage (MV) information as a separate article would provide the electrical industry, including inspectors, with more guidance in terms of medium voltage installations.

Response Message: FR-9609-NFPA 70-2021

[Public Input No. 4364-NFPA 70-2020 \[Part I.\]](#)

[Public Input No. 3827-NFPA 70-2020 \[Global Input\]](#)

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

17 Affirmative All

2 Affirmative with Comments

1 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Jones, Robert A.

I am very much in favor of this first revision. I have seen many comments expressing that this is an easy button for people with little or zero training in the NEC. The NEC is not intended as an instruction manual for untrained people and this revision will not help untrained people with using or understanding the NEC. This revision will give educators and trainers better material to utilize for training purposes. The biggest complaint heard about the NEC from students and trainers is that important installation requirements are scattered throughout the book. Training has not been focused on medium voltage requirements because curriculum developers and authors of training material find it very difficult to target where all the requirements are located. This new article for medium voltage installation requirements is a step in the right direction for educational purposes.

Tellas, Ronald
agreed.

Negative with Comment

Krueger, Kyle

Negative Ballot Statement FR 9609 (New Article 305) Most Importantly: The Correlating Committee has a responsibility to enforce the requirements of the 2020 NEC Style Manual (Section 2.1.3) which clearly indicates that articles must be on a "specific topic." Combining parts of Articles 314, 368, and 399 is completely in violation of the NEC Style Manual as this would bring multiple topics into the same article. A voltage range does not warrant a "specific topic" for an article, it is just a voltage range for a specific topic, consistent with NEC structure. The NEC Style Manual is also being violated by these first revisions, in addition to introducing multiple scope and purview problems, very indicative of the very problems once fixed by the NEC Correlating Committee in the 1990s. These significant issues will also need to be addressed in the FR creating proposed new Articles 495 and 235; the same problems that introduce scope and purview problems and most importantly create a clear violation of Section 2.1.3 of the NEC Style Manual. What good is having a Style Manual if the Code Panels don't follow it and the Correlating Committee does not enforce it, consistently? The deference needs to lie with correct action and disposition of the technical committees (CMP-10, CMP-5, CMP-8, CMP-11, CMP-1) and their wisdom and reasoning for not accepting these proposed damaging revisions in structure to the NEC. Creating these first revisions is a huge mistake and actually is a giant leap backwards for the NEC. Confusion will result and these revisions will undoubtedly create will take significant time and effort to correct to the point of restoring the current usability that was created the last time these issues were identified and fixed. Public Inputs of the assigned TG on Medium Voltage are not technically substantiated, which is out of step with the Regulations Governing the Development of Codes and Standards. There is no valid reason to revise the NEC with respect to installations over 1000 volts. The proposed restructuring of all these requirements throughout the NEC is related to claims of inability to find the information. The NEC is not broken, and all of these public Inputs are unnecessary and were generated internally without one public input about this issue. These are a personal agenda only. Those that adequately are trained in the NEC history and use in applying it to medium and high voltage installations are not having problems. These 2023 Public Inputs also completely ignore the work of the NEC Correlating Committee in the early 1990s that addresses these exact issues at that time. Yes, it was the work of an NEC Correlating Committee assigned task group to resolve the circular references and significant issues of purview among the

NEC committees. The primary reasons for establishing NEC structure at that time was to avoid the “vicious-circle problem” as they referred to it, reduce repetition of requirements, improve enforceability, and to allow for future growth. This proposed revision does nothing more than relocate existing requirements. The only substantiation provided for such a significant revision is to better align requirements. The substantiation additionally implies that the technical committee cannot focus on or fully understand requirements for the installation of branch circuits, feeders and services 1000 volts and higher which is totally incorrect.

Article 305 Requirements for Wiring Methods and Materials for Systems Rated Over 1000 Volts ac, 1500 Volts dc, Nominal

Part I. General Requirements

305.1 Scope.

This article covers requirements for wiring methods and materials for wiring installations for systems rated over 1000 volts ac, 1500 volts dc, nominal.

305.2 Definitions.

The definition in this section shall only apply within this article.

Outdoor Overhead Conductors.

Single conductors, insulated, covered, or bare, installed outdoors on support structures in free air.

305.3 Conductors of Different Systems.

Conductors of circuits rated over 1000 volts ac, 1500 volts dc, nominal, shall not occupy the same equipment wiring enclosure, cable, or raceway with conductors of circuits rated 1000 volts ac, 1500 volts dc, nominal, or less unless otherwise permitted as follows:

- (1) Where contained within the individual wiring enclosure, primary leads of electric-discharge lamp ballasts insulated for the primary voltage of the ballast shall be permitted to occupy the same luminaire, sign, or outline lighting enclosure as the branch-circuit conductors.
- (2) Excitation, control, relay, and ammeter conductors used in connection with any individual motor or starter shall be permitted to occupy the same enclosure as the motor-circuit conductors.
- (3) Conductors of different voltage ratings shall be permitted in motors, transformers, switchgear, switchboards, control assemblies, and similar equipment.
- (4) If the conductors of each system in a manhole are permanently and effectively separated from the conductors of the other systems and securely fastened to racks, insulators, or other approved supports, conductors of different voltage ratings shall be permitted.

Conductors having nonshielded insulation and operating at different voltage levels shall not occupy the same enclosure, cable, or raceway.

305.4 Conductor Bending Radius.

The conductor shall not be bent to a radius less than 8 times the overall diameter for nonshielded conductors or 12 times the overall diameter for shielded or lead-covered conductors during or after installation. For multiconductor or multiplexed single-conductor cables having individually shielded conductors, the minimum bending radius ~~is~~shall be 12 times the diameter of the individually shielded conductors or 7 times the overall diameter, whichever is greater.

305.5 Protection Against Induction Heating.

Metallic raceways and associated conductors shall be arranged so as to avoid heating of the raceway in accordance with the applicable provisions of 300.20.

305.6 Covers Required.

Suitable covers shall be installed on all boxes, fittings, and similar enclosures to prevent accidental contact with energized parts or physical damage to parts or insulation.

305.7 Wiring Methods.

Conductors shall be permitted to be installed in accordance with any of the wiring methods identified in Table 305.7.

Table 305.7 Wiring Methods Permitted for Use in Systems Rated Over 1000 Volts ac, 1500 Volts dc, Nominal

<u>Wiring Methods Permitted for Use Above 1000 Volts ac, 1500 Volts dc</u>	<u>Voltage Levels</u>	<u>Reference</u>
<u>Pull and junction boxes, conduit bodies, and handhole enclosures</u>	<u>Over 1000</u>	<u>Article 305, Part II</u>
<u>Metal-clad cable (Type MC)</u>	<u>0–35,000</u>	<u>Article 330</u>
<u>Type P cable</u>	<u>0–2000</u>	<u>Article 337</u>
<u>Intermediate metal conduit (Type IMC)</u>	<u>Not specified</u>	<u>Article 342</u>
<u>Rigid metal conduit (Type RMC)</u>	<u>Not specified</u>	<u>Article 344</u>
<u>Rigid polyvinyl chloride conduit (Type PVC)</u>	<u>Not specified</u>	<u>Article 352</u>
<u>Reinforced thermosetting resin conduit (Type RTRC)</u>	<u>Not specified</u>	<u>Article 355</u>
<u>Electrical metallic tubing (Type EMT)</u>	<u>Not specified</u>	<u>Article 358</u>
<u>Auxiliary gutters</u>	<u>Not specified</u>	<u>Article 366</u>
<u>Busway</u>	<u>Over 1000</u>	<u>Article 305, Part III</u>
<u>Cablebus</u>	<u>0–35,000</u>	<u>Article 370</u>
<u>Cable trays</u>	<u>0–35,000</u>	<u>Article 392</u>
<u>Messenger-supported wiring</u>	<u>0–35,000</u>	<u>Article 396</u>
<u>Outdoor overhead conductors</u>	<u>Over 1000</u>	<u>Article 305, Part IV</u>

Exposed runs of Type MV cables, bare conductors, and bare busbars shall be permitted in locations accessible only to qualified persons. Busbars shall be permitted to be either copper or aluminum.

Exception: Airfield lighting cable used in series circuits that are powered by regulators and installed in restricted airport lighting vaults shall be permitted as exposed cable installations.

Informational Note: An example of a common application is FAA L-824 cables installed as exposed runs within a restricted vault area.

305.8 Raceways in Wet Locations Above Grade.

Where raceways are installed in wet locations above grade, the interior of these raceways shall be considered to be a wet location. Insulated conductors and cables installed in raceways in wet locations above grade shall ~~comply with 310.10(C)~~ be either moisture-impervious metal-sheathed or of a type listed for use in wet locations.

305.9 Braid-Covered Insulated Conductors — Exposed Installation.

Exposed runs of braid-covered insulated conductors shall have a flame-retardant braid. If the conductors used do not have this protection, a flame-retardant saturant shall be applied to the braid covering after installation. This treated braid covering shall be stripped back a safe distance at conductor terminals, according to the operating voltage. Where practicable, this distance shall not be less than 25 mm (1 in.) for each kilovolt of the conductor-to-ground voltage of the circuit.

305.10 Insulation Shielding.

Metallic and semiconducting insulation shielding components of shielded cables shall be removed for a distance dependent on the circuit voltage and insulation. Stress reduction means shall be provided at all terminations of factory-applied shielding.

Metallic shielding components such as tapes, wires, or braids, or combinations ~~thereof~~ of them, shall be connected to an equipment grounding conductor, an equipment grounding busbar, or a grounding electrode.

305.11 Moisture or Mechanical Protection for Metal-Sheathed Cables.

Where cable conductors emerge from a metal sheath and where protection against moisture or physical damage is necessary, the insulation of the conductors shall be protected by a cable sheath terminating device.

305.12 Danger Signs.

Danger signs shall be conspicuously posted at points of access to conductors in all raceway systems and cable systems. The sign(s) shall meet the requirements in 110.21(B), shall be readily visible, and shall state the following:

DANGER—HIGH VOLTAGE—KEEP OUT

305.15 Underground Installations.

(A) General.

Underground conductors shall be identified for the voltage and conditions under which they are installed. ~~Direct-burial cables shall comply with the provisions of 310.10(E)~~ Conductors used for direct-burial applications shall be of a type identified for such use. Underground cables shall be installed in accordance with 305.15(A)(1), (A)(2), or (A)(3), and the installation shall meet the depth requirements of Table 305.15.

Table 305.15 Minimum Cover* Requirements

	General Conditions (not otherwise specified)						Special Conditions (use if applicable)					
	Column 1		Column 2		Column 3		Column 4		Column 5		Column 6	
	Direct-Buried Cables ^{b1}		RTRC, PVC, and HDPE Conduit ^{c2}		Rigid Metal Conduit and Intermediate Metal Conduit		Raceways Under Buildings or Exterior Concrete Slabs, 100 mm (4 in.) Minimum Thickness ^{d3}		Cables in Airport Runways or Adjacent Areas Where Trespass Is Prohibited		Areas Subject to Vehicular Traffic, Such as Thoroughfares and Commercial Parking Areas	
Circuit Voltage	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
Over 1000 V ac, 1500 V dc, through 22 kV	750	30	450	18	150	6	100	4	450	18	600	24
Over 22 kV through 40 kV	900	36	600	24	150	6	100	4	450	18	600	24
Over 40 kV	1000	42	750	30	150	6	100	4	450	18	600	24

General Notes:

^{a1}. Cover ~~is~~shall be defined as the shortest distance in millimeters (inches) measured between a point on the top surface of any direct-buried conductor, cable, conduit, or other raceway and the top surface of finished grade, concrete, or similar cover.

¹². Lesser depths shall be permitted where cables and conductors rise for terminations or splices or where access is otherwise required.

²³. Where solid rock prevents compliance with the cover depths specified in this table, the wiring shall be installed in a metal or nonmetallic raceway permitted for direct burial. The raceways shall be covered by a minimum of 50 mm (2 in.) of concrete extending down to rock.

³⁴. In industrial establishments, where conditions of maintenance and supervision ensure that qualified persons will service the installation, the minimum cover requirements, for other than rigid metal conduit and intermediate metal conduit, shall be permitted to be reduced 150 mm (6 in.) for each 50 mm (2 in.) of concrete or equivalent placed entirely within the trench over the underground installation.

Specific Footnotes:

^{b1}Underground direct-buried cables that are not encased or protected by concrete and are buried 750 mm (30 in.) or more below grade shall have their location identified by a warning ribbon that is placed in the trench at least 300 mm (12 in.) above the cables.

^{e2}Listed by a qualified testing agency as suitable for direct burial without encasement. All other nonmetallic systems shall require 50 mm (2 in.) of concrete or equivalent above conduit in addition to the table depth.

^{d3}The slab shall extend a minimum of 150 mm (6 in.) beyond the underground installation, and a warning ribbon or other effective means suitable for the conditions shall be placed above the underground installation.

(1) Shielded Cables and Nonshielded Cables in Metal-Sheathed Cable Assemblies.

Underground cables, including nonshielded, Type MC and moisture-impervious metal sheath cables, shall have those sheaths grounded through an effective grounding path meeting the requirements of 250.4(A)(5) or 250.4(B)(4). They shall be direct buried or installed in raceways identified for the use.

(2) Industrial Establishments.

In industrial establishments, where conditions of maintenance and supervision ensure that only qualified persons service the installed cable, nonshielded single-conductor cables with insulation types up to 2000 volts that are listed for direct burial shall be permitted to be directly buried.

(3) Other Nonshielded Cables.

Other nonshielded cables not covered in 305.15(A)(1) or (A)(2) shall be installed in rigid metal conduit, intermediate metal conduit, or rigid nonmetallic conduit encased in not less than 75 mm (3 in.) of concrete.

(B) Wet Locations.

The interior of enclosures or raceways installed underground shall be considered to be a wet location. Insulated conductors and cables installed in these enclosures or raceways in underground installations shall be listed for use in wet locations and shall ~~comply with 310.10(C)~~ be either moisture-impervious metal-sheathed or of a type listed for use in wet locations. Any connections or splices in an underground installation shall be approved for wet locations.

(C) Protection from Damage.

Conductors emerging from the ground shall be enclosed in listed raceways. Raceways installed on poles shall be of rigid metal conduit, intermediate metal conduit, RTRC-XW, Schedule 80 PVC conduit, or equivalent, extending from the minimum cover depth specified in Table 305.15 to a point 2.5 m (8 ft) above finished grade. Conductors entering a building shall be protected by an approved enclosure or raceway from the minimum cover depth to the point of entrance. Where direct-buried conductors, raceways, or cables are subject to movement by settlement or frost, they shall be installed to prevent damage to the enclosed conductors or to the equipment connected to the raceways. Metallic enclosures shall be grounded.

(D) Splices.

Direct burial cables shall be permitted to be spliced or tapped without the use of splice boxes, ~~provided if~~ they are installed using materials suitable for the

application. The taps and splices shall be watertight and protected from mechanical damage. Where cables are shielded, the shielding shall be continuous across the splice or tap.

Exception: At splices of an engineered cabling system, metallic shields of direct-buried single-conductor cables with maintained spacing between phases shall be permitted to be interrupted and overlapped. Where shields are interrupted and overlapped, each shield section shall be grounded at one point.

(E) Backfill.

Backfill containing large rocks, paving materials, cinders, large or sharply angular substances, or corrosive materials shall not be placed in an excavation where materials can damage or contribute to the corrosion of raceways, cables, or other substructures or where it ~~may~~might prevent adequate compaction of fill.

Protection in the form of granular or selected material or suitable sleeves shall be provided to prevent physical damage to the raceway or cable.

(F) Raceway Seal.

Where a raceway enters from an underground system, the end within the building shall be sealed with an identified compound ~~so as~~ to prevent the entrance of moisture or gases, or it shall be so arranged to prevent moisture from contacting live parts.

Part II. Pull and Junction Boxes, Conduit Bodies, and Handhole Enclosures

305.20 General.

(A) Pull and Junction Boxes.

Where pull and junction boxes are used on systems over 1000 volts ac, 1500 volts dc, the installation shall comply with the requirements of Part II of this article and with the following general requirements of Article 314:

- (1) Part I, 314.2; 314.3; and 314.4
- (2) Part II, 314.15; 314.17; 314.20; 314.23(A), (B), or (G); 314.28(B); and 314.29
- (3) Part III, 314.40(A) and (C); and 314.41

(B) Conduit Bodies.

Where conduit bodies are used on systems over 1000 volts ac, 1500 volts dc, the installation shall comply with the requirements of Part II of this article and with the following general requirements of Article 314:

- (1) Part I, 314.4
- (2) Part II, 314.15; 314.17; 314.23(A), (E), or (G); 314.28(A)(3); and 314.29
- (3) Part III, 314.40(A) and 314.41

(C) Handhole Enclosures.

Where handhole enclosures are used on systems over 1000 volts ac, 1500 volts dc, the installation shall comply with the requirements of Part II of this article and with the following general requirements of Article 314:

(1) Part I, 314.3 and 314.4

(2) Part II, 314.15; 314.17; 314.23(G); 314.28(B); 314.29; and 314.30

305.21 Size of Pull and Junction Boxes, Conduit Bodies, and Handhole Enclosures.

Pull and junction boxes and handhole enclosures shall provide approved space and dimensions for the installation of conductors and shall comply with the specific requirements of this section. Conduit bodies shall be permitted if they meet the dimensional requirements for boxes.

(A) For Straight Pulls.

The length of the box shall not be less than 48 times the outside diameter, over sheath, of the largest shielded or lead-covered conductor or cable entering the box. The length shall not be less than 32 times the outside diameter of the largest nonshielded conductor or cable.

(B) For Angle or U Pulls.

(1) Distance to Opposite Wall.

The distance between each cable or conductor entry inside the box and the opposite wall of the box shall not be less than 36 times the outside diameter, over sheath, of the largest cable or conductor. This distance shall be increased for additional entries by the amount of the sum of the outside diameters, over sheath, of all other cables or conductor entries through the same wall of the box.

Exception No. 1: Where a conductor or cable entry is in the wall of a box opposite a removable cover, the distance from that wall to the cover shall be permitted to be not less than the bending radius for the conductors in accordance with 305.4.

Exception No. 2: Where cables are nonshielded and not lead covered, the distance of 36 times the outside diameter shall be permitted to be reduced to 24 times the outside diameter.

(2) Distance Between Entry and Exit.

The distance between a cable or conductor entry and its exit from the box shall not be less than 36 times the outside diameter, over sheath, of that cable or conductor.

Exception: Where cables are nonshielded and not lead covered, the distance of 36 times the outside diameter shall be permitted to be reduced to 24 times the outside diameter.

(C) Removable Sides.

One or more sides of any pull box shall be removable.

305.22 Construction and Installation Requirements.

(A) Corrosion Protection.

Boxes shall be made of material inherently resistant to corrosion or shall be suitably protected, both internally and externally, by enameling, galvanizing, plating, or other means.

(B) Passing Through Partitions.

Suitable bushings, shields, or fittings having smooth, rounded edges shall be provided where conductors or cables pass through partitions and at other locations where necessary.

(C) Complete Enclosure.

Boxes shall provide a complete enclosure for the contained conductors or cables.

(D) Wiring is Accessible.

Boxes and conduit bodies shall be installed so that the conductors are accessible without removing any fixed part of the building or structure. Working space shall be provided in accordance with 110.34.

(E) Suitable Covers.

Boxes shall be closed by suitable covers securely fastened in place. Underground box covers that weigh over 45 kg (100 lb) shall be considered meeting this requirement. Covers for boxes shall be permanently marked with the following readily visible on the outside of the box cover in block type and at least 13 mm (**1/2** in.) in height:

DANGER — HIGH VOLTAGE — KEEP OUT.

(F) Suitable for Expected Handling.

Boxes and their covers shall be capable of withstanding the handling to which they are likely to be subjected.

Part III. Busways

305.32 Adjacent and Supporting Structures.

Metal-enclosed busways shall be installed so that any temperature rise from induced circulating currents in adjacent ferrous metal parts will not be hazardous to personnel or constitute a fire hazard.

305.33 Barriers and Seals.

(A) Vapor Seals.

Busway runs that have sections located both inside and outside of buildings shall have a vapor seal at the building wall to prevent interchange of air between indoor and outdoor sections.

Exception: Vapor seals shall not be required in forced-cooled bus.

(B) Fire Barriers.

Fire barriers shall be provided where fire walls, floors, or ceilings are penetrated.

Informational Note: See 300.21 for information concerning the spread of fire or products of combustion.

305.34 Drain Facilities.

Drain plugs, filter drains, or similar methods shall be provided to remove condensed moisture from low points in busway runs.

305.35 Ventilated Bus Enclosures.

Ventilated busway enclosures shall be installed in accordance with Part III of Article 110 and 490.24.

305.36 Terminations and Connections.

Where bus enclosures terminate at machines cooled by flammable gas, seal-off bushings, baffles, or other means shall be provided to prevent accumulation of flammable gas in the busway enclosures.

All conductor termination and connection hardware shall be accessible for installation, connection, and maintenance.

305.37 Switches.

Switching devices or disconnecting links provided in the busway run shall have the same momentary rating as the busway. Disconnecting links shall be plainly marked to be removable only when the bus is de-energized. Switching devices that are not load-break shall be interlocked to prevent operation under load, and disconnecting link enclosures shall be interlocked to prevent access to energized parts.

305.38 Wiring 1000 Volts or Less, Nominal.

Secondary control devices and wiring that are provided as part of the metal-enclosed bus run shall be insulated by fire-retardant barriers from all primary circuit elements with the exception of short lengths of wire, such as at instrument transformer terminals.

305.39 Expansion Fittings.

Flexible or expansion connections shall be provided in long, straight runs of bus to allow for temperature expansion or contraction, or where the busway run crosses building vibration insulation joints.

305.40 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 ratings consistent with system requirements.

305.41 Grounding.

Metal-enclosed busways shall be grounded.

305.42 Marking.

Each busway run shall be provided with a permanent nameplate on which the following information is provided:

- (1) Rated voltage.
- (2) Rated continuous current. If the bus is forced-cooled, both the normal forced-cooled rating and the self-cooled (not forced-cooled) rating for the same temperature rise shall be given.
- (3) Rated frequency.
- (4) Rated impulse withstand voltage.

(5) Rated 60-Hz withstand voltage (dry).

(6) Rated momentary current.

(7) Manufacturer's name or trademark.

Informational Note: See IEEE C37.23-2015, *IEEE Standard for Metal-Enclosed Bus*, for construction and testing requirements for metal-enclosed bus assemblies.

Part IV. Outdoor Overhead Conductors

305.50 Uses Permitted.

Outdoor overhead conductors as covered in Part IV of this article shall be permitted only for systems rated over 1000 volts ac, 1500 volts dc, nominal, as follows:

(1) Outdoors in free air

(2) For service conductors, feeders, or branch circuits

Informational Note: See IEEE C2, *National Electrical Safety Code*, and ANSI/IEEE 3001.2, *Recommended Practice for Evaluating the Electrical Service Requirements of Industrial and Commercial Power Systems*, for additional information on outdoor overhead conductors covered by Part IV of this article.

305.51 Support.

(A) Conductors.

Documentation of the engineered design by a licensed professional engineer engaged primarily in the design of such systems and the spacing between conductors shall be available upon request of the authority having jurisdiction and shall include the following:

(1) Applied voltage

(2) Conductor size

(3) Distance between support structures

(4) Type of structure

(5) Wind/ice loading

(6) Surge protection

(B) Structures.

Structures of wood, metal, or concrete, or combinations of those materials shall be provided for support of overhead conductors. Documentation of the engineered design by a licensed professional engineer engaged primarily in the design of such systems and the installation of each support structure shall be available upon request of the authority having jurisdiction and shall include the following:

(1) Soil conditions

(2) Foundations and structure settings

(3) Weight of all supported conductors and equipment

- (4) Weather loading and other conditions such as, but not limited to, ice, wind, temperature, and lightning
- (5) Angle where change of direction occurs
- (6) Spans between adjacent structures
- (7) Effect of dead-end structures
- (8) Strength of guy wires and guy anchors
- (9) Structure size and material(s)
- (10) Hardware

(C) Insulators.

Insulators used to support conductors shall be rated for all of the following:

- (1) Applied phase-to-phase voltage
- (2) Mechanical strength required for each individual installation
- (3) Impulse withstand BIL in accordance with Table 490.24

Informational Note: The lists in 305.51(A), (B), and (C) are not all-inclusive.

~~Part II. Requirements for over 1000 Volts, Nominal~~

~~300.31 Covers Required.~~

~~Suitable covers shall be installed on all boxes, fittings, and similar enclosures to prevent accidental contact with energized parts or physical damage to parts or insulation.~~

~~300.32 Conductors of Different Systems.~~

~~See 300.3(C)(2).~~

~~300.34 Conductor Bending Radius.~~

~~The conductor shall not be bent to a radius less than 8 times the overall diameter for nonshielded conductors or 12 times the overall diameter for shielded or lead-covered conductors during or after installation. For multiconductor or multiplexed single-conductor cables having individually shielded conductors, the minimum bending radius is 12 times the diameter of the individually shielded conductors or 7 times the overall diameter, whichever is greater.~~

~~300.35 Protection Against Induction Heating.~~

~~Metallic raceways and associated conductors shall be arranged so as to avoid heating of the raceway in accordance with the applicable provisions of 300.20.~~

~~300.37 Aboveground Wiring Methods.~~

~~Aboveground conductors shall be installed in rigid metal conduit, in intermediate metal conduit, in electrical metallic tubing, in RTRC and PVC conduit, in cable trays, in auxiliary gutters, as busways, as cablebus, in other identified raceways, or as exposed runs of metal-clad cable suitable for the use and purpose. In locations accessible to qualified persons only, exposed runs of Type MV cables, bare conductors, and bare busbars shall also be permitted. Busbars shall be permitted to be either copper or aluminum.~~

~~Exception: Airfield lighting cable used in series circuits that are powered by regulators and installed in restricted airport lighting vaults shall be permitted as exposed cable installations.~~

~~Informational Note: FAA L-824 cables installed as exposed runs within a restricted vault area are common applications.~~

~~**300.38 Raceways in Wet Locations Above Grade.**~~

~~Where raceways are installed in wet locations above grade, the interior of these raceways shall be considered to be a wet location. Insulated conductors and cables installed in raceways in wet locations above grade shall comply with 310.10(C).~~

~~**300.39 Braid Covered Insulated Conductors—Exposed Installation.**~~

~~Exposed runs of braid covered insulated conductors shall have a flame-retardant braid. If the conductors used do not have this protection, a flame-retardant saturant shall be applied to the braid covering after installation. This treated braid covering shall be stripped back a safe distance at conductor terminals, according to the operating voltage. Where practicable, this distance shall not be less than 25 mm (1 in.) for each kilovolt of the conductor to ground voltage of the circuit.~~

~~**300.40 Insulation Shielding.**~~

~~Metallic and semiconducting insulation shielding components of shielded cables shall be removed for a distance dependent on the circuit voltage and insulation. Stress reduction means shall be provided at all terminations of factory applied shielding.~~

~~Metallic shielding components such as tapes, wires, or braids, or combinations thereof, shall be connected to an equipment grounding conductor, an equipment grounding busbar, or a grounding electrode.~~

~~**300.42 Moisture or Mechanical Protection for Metal Sheathed Cables.**~~

~~Where cable conductors emerge from a metal sheath and where protection against moisture or physical damage is necessary, the insulation of the conductors shall be protected by a cable sheath terminating device.~~

~~**300.45 Danger Signs.**~~

~~Danger signs shall be conspicuously posted at points of access to conductors in all raceway systems and cable systems. The sign(s) shall meet the requirements in 110.21(B), shall be readily visible, and shall state the following: DANGER—HIGH VOLTAGE—KEEP OUT~~

~~**300.50 Underground Installations.**~~

~~**(A) General.**~~

~~Underground conductors shall be identified for the voltage and conditions under which they are installed. Direct burial cables shall comply with the provisions of 310.10(E). Underground cables shall be installed in accordance with 300.50(A)(1), (A)(2), or (A)(3), and the installation shall meet the depth requirements of Table 300.50.~~

~~Table 300.50 Minimum Cover^a Requirements~~

	General Conditions (not otherwise specified)						Special Conditions (use if applicable)					
	Column 1		Column 2		Column 3		Column 4		Column 5		Column 6	
	Direct-Buried Cables^b		RTRC,^a PVC, and HDPE Conduit^c		Rigid-Metal Conduit and Intermediate Metal Conduit		Raceways Under Buildings or Exterior Concrete Slabs, 100-mm (4 in.) Minimum Thickness^d		Cables in Airport Runways or Adjacent Areas Where Trespass Is Prohibited		Areas Subject to Vehicular Traffic, Such as Thoroughfares and Commercial Parking Areas	
Circuit Voltage	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
Over 1000-V through 22-kV	750	30	450	18	150	6	100	4	450	18	600	24
Over 22-kV through 40-kV	900	36	600	24	150	6	100	4	450	18	600	24
Over 40-kV	1000	42	750	30	150	6	100	4	450	18	600	24

General Notes:

1. Lesser depths shall be permitted where cables and conductors rise for terminations or splices or where access is otherwise required.
2. Where solid rock prevents compliance with the cover depths specified in this table, the wiring shall be installed in a metal or nonmetallic raceway permitted for direct burial. The raceways shall be covered by a minimum of 50 mm (2 in.) of concrete extending down to rock.
3. In industrial establishments, where conditions of maintenance and supervision ensure that qualified persons will service the installation, the minimum cover requirements, for other than rigid metal conduit and intermediate metal conduit, shall be permitted to be reduced 150 mm (6 in.) for each 50 mm (2 in.) of concrete or equivalent placed entirely within the trench over the underground installation.

Specific Footnotes:

^aCover is defined as the shortest distance in millimeters (inches) measured between a point on the top surface of any direct-buried conductor, cable, conduit, or other raceway and the top surface of finished grade, concrete, or similar cover.

^bUnderground direct-buried cables that are not encased or protected by concrete and are buried 750 mm (30 in.) or more below grade shall have their location identified by a warning ribbon that is placed in the trench at least 300 mm (12 in.) above the cables.

~~^cListed by a qualified testing agency as suitable for direct burial without encasement. All other nonmetallic systems shall require 50 mm (2 in.) of concrete or equivalent above conduit in addition to the table depth.~~

~~^dThe slab shall extend a minimum of 150 mm (6 in.) beyond the underground installation, and a warning ribbon or other effective means suitable for the conditions shall be placed above the underground installation.~~

~~(1) Shielded Cables and Nonshielded Cables in Metal-Sheathed Cable Assemblies.~~

~~Underground cables, including nonshielded, Type MC and moisture-impervious metal-sheath cables, shall have those sheaths grounded through an effective grounding path meeting the requirements of 250.4(A)(5) or (B)(4). They shall be direct buried or installed in raceways identified for the use.~~

~~(2) Industrial Establishments.~~

~~In industrial establishments, where conditions of maintenance and supervision ensure that only qualified persons service the installed cable, nonshielded single-conductor cables with insulation types up to 2000 volts that are listed for direct burial shall be permitted to be directly buried.~~

~~(3) Other Nonshielded Cables.~~

~~Other nonshielded cables not covered in 300.50(A)(1) or (A)(2) shall be installed in rigid metal conduit, intermediate metal conduit, or rigid nonmetallic conduit encased in not less than 75 mm (3 in.) of concrete.~~

~~(B) Wet Locations.~~

~~The interior of enclosures or raceways installed underground shall be considered to be a wet location. Insulated conductors and cables installed in these enclosures or raceways in underground installations shall be listed for use in wet locations and shall comply with 310.10(C). Any connections or splices in an underground installation shall be approved for wet locations.~~

~~(C) Protection from Damage.~~

~~Conductors emerging from the ground shall be enclosed in listed raceways. Raceways installed on poles shall be of rigid metal conduit, intermediate metal conduit, RTRC-XW, Schedule 80 PVC conduit, or equivalent, extending from the minimum cover depth specified in Table 300.50 to a point 2.5 m (8 ft) above finished grade. Conductors entering a building shall be protected by an approved enclosure or raceway from the minimum cover depth to the point of entrance. Where direct-buried conductors, raceways, or cables are subject to movement by settlement or frost, they shall be installed to prevent damage to the enclosed conductors or to the equipment connected to the raceways. Metallic enclosures shall be grounded.~~

~~(D) Splices.~~

~~Direct burial cables shall be permitted to be spliced or tapped without the use of splice boxes, provided they are installed using materials suitable for the application. The taps and splices shall be watertight and protected from mechanical damage. Where cables are shielded, the shielding shall be continuous across the splice or tap.~~

~~*Exception: At splices of an engineered cabling system, metallic shields of direct-buried single-conductor cables with maintained spacing between phases shall be permitted to be interrupted and overlapped. Where shields are interrupted and overlapped, each shield section shall be grounded at one point.*~~

~~(E) Backfill.~~

~~Backfill containing large rocks, paving materials, cinders, large or sharply angular substances, or corrosive materials shall not be placed in an excavation where materials can damage or contribute to the corrosion of raceways, cables, or other substructures or where it may prevent adequate compaction of fill.~~

~~Protection in the form of granular or selected material or suitable sleeves shall be provided to prevent physical damage to the raceway or cable.~~

~~(F) Raceway Seal.~~

~~Where a raceway enters from an underground system, the end within the building shall be sealed with an identified compound so as to prevent the entrance of moisture or gases, or it shall be so arranged to prevent moisture from contacting live parts.~~

**First Revision No. 9620-NFPA 70-2021 [Global Input]**

See attached for changes and moves of definitions in Panel 3 to Article 100.

Supplemental Information

<u>File Name</u>	<u>Description</u> <u>Approved</u>
NEC_CMP-3_Defs_to_100_Global_FR-9620.1611952096222_2_.docx	For staff use
NEC_CMP-3_Defs_to_100_Global_FR-9620.docx	For ballot

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 29 15:23:20 EST 2021

Committee Statement

Committee Statement: CMP-3 affirms the movement of definitions from the articles in our purview to Article 100.

Response Message: FR-9620-NFPA 70-2021

[Public Input No. 3966-NFPA 70-2020 \[Section No. 760.2\]](#)

[Public Input No. 3900-NFPA 70-2020 \[New Definition after Definition: Field Labeled \(as applied ...\)\]](#)

[Public Input No. 3963-NFPA 70-2020 \[Section No. 727.2\]](#)

[Public Input No. 3962-NFPA 70-2020 \[Section No. 725.2\]](#)

[Public Input No. 3964-NFPA 70-2020 \[Section No. 728.2\]](#)

[Public Input No. 3902-NFPA 70-2020 \[Section No. 728.2\]](#)

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

NEC_CMP-3 Definitions moving to Article 100

Global FR 9488

~~725.2 Definitions.~~

~~The definitions in this section shall apply only within this article.~~

Abandoned Class 2, Class 3, and PLTC Cable.

Installed Class 2, Class 3, and PLTC cable that is not terminated at equipment and not identified for future use with a tag. (CMP-3)

Cable Bundle.

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

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

~~727.2 Definition.~~

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

Type ITC Instrumentation Tray Cable.

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

~~728.2 Definition.~~

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

Fire-Resistive Cable System.

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

~~760.2 Definitions.~~

~~The definitions in this section shall apply only within this article.~~

Abandoned Fire Alarm Cable.

Installed fire alarm cable that is not terminated at equipment other than a connector and not identified for future use with a tag. (CMP-3)

Fire Alarm Circuit.

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

Fire Alarm Circuit Integrity (CI) Cable.

Cable used in fire alarm systems to ensure continued operation of critical circuits during a specified time under fire conditions. [\(CMP-3\)](#)

Non–Power-Limited Fire Alarm Circuit (NPLFA).

A fire alarm circuit powered by a source that complies with 760.41 and 760.43. [\(CMP-3\)](#)

Power-Limited Fire Alarm Circuit (PLFA).

A fire alarm circuit powered by a source that complies with 760.121. [\(CMP-3\)](#)



First Revision No. 9375-NFPA 70-2021 [Detail]

(E) Cables, Raceways, or Boxes Installed in or Under Metal-Corrugated Roof Decking.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Wed Jan 20 16:35:51 EST 2021

Committee Statement

Committee Statement: No technical substantiation has been provided as to a problem being caused with other types of roofing. The revision is being made to modify the section title to add "Metal-Corrugated" in front of "roof decking". The title change is being made for clarity to specify that this section applies only to metal-corrugated roof decking. The issue that arises with roofing or re-roofing metal corrugated roofing is unique and different than other types of roofing. Metal corrugated roof decking installations utilize longer (self-tapping) fastening methods in order to comply with hold down requirements that create the hazard addressed in this section.

Response Message: FR-9375-NFPA 70-2021

Public Input No. 1057-NFPA 70-2020 [Section No. 300.4(E)]

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9382-NFPA 70-2021 [Detail]****300.4(E)**

Modify exception #1 as follows:

Exception: Rigid metal conduit and intermediate metal conduit, with malleable iron fittings or boxes, shall not be required to comply with 300.4(E).

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Thu Jan 21 05:34:42 EST 2021

Committee Statement

Committee Statement: The addition of malleable iron fittings or boxes addresses the concerns identified in the public input. "Heavy duty box" was not utilized because there is no definition, nor is the term utilized in the NEC.

Response Message: FR-9382-NFPA 70-2021

[Public Input No. 1509-NFPA 70-2020 \[Section No. 300.4\(E\)\]](#)

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9435-NFPA 70-2021 [Detail]**

See revisions to 725.24.

Class 1, Class 2, and Class 3 circuits shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, hangers, cable ties listed and identified for securement and support, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4(D).

Supplemental Information

<u>File Name</u>	<u>Description</u> <u>Approved</u>
NEC_725.24_FR9435.docx	For staff use

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Thu Jan 21 17:51:50 EST 2021

Committee Statement

Committee Statement: CMP3 has modified the text to add listing requirements for cable ties.

Listing is appropriate as the associated standards define critical performance ranges that can impact their suitability for use, including minimum and maximum operating temperature, resistance to ultraviolet light for outdoor installations, etc.

The change is being made in the new Article 722.24, Cables for Power Limited Circuits, in 722.24 since 725.24 is deleted in article 725 and moved to the new Article. If the new Article is rejected the change will be made to 725.24.

Response Message: FR-9435-NFPA 70-2021

[Public Input No. 3038-NFPA 70-2020 \[Section No. 725.24\]](#)

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9438-NFPA 70-2021 [Detail]**

See revisions to 725.24.

725.24 Mechanical Execution of Work.

Class 1, Class 2, and Class 3 circuits shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, hangers, cable ties, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with ~~300.4(D)~~300.4 and 300.11.

Supplemental Information

<u>File Name</u>	<u>Description Approved</u>
NEC_725.24_FR9438.docx	Staff Use

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Thu Jan 21 18:03:06 EST 2021

Committee Statement

Committee Statement: CMP3 has modified the text remove "D" from "300.4(D)" and added 300.11 as appropriate.
The change is already incorporated in FR TG2-18 establishing the new Article for Cables for Power-Limited Circuits. If the new Article is rejected the change will be made to 725.24.

Response Message: FR-9438-NFPA 70-2021

Public Input No. 3064-NFPA 70-2020 [Section No. 725.24]

Ballot Results

✔ This item has passed ballot

22 Eligible Voters
2 Not Returned
19 Affirmative All
1 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Christakos, Andrew C.
Sleights, John E.

Affirmative All

Anderson, Richard S.
Bassett, Douglas P.
Burlison, Steven D.
Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9450-NFPA 70-2021 [Detail]**

See revisions to 725.130(B) Class 2 and Class 3 Wiring Methods.

Conductors on the load side of the power source shall be insulated ~~at not less than the requirements of 725.179~~in accordance with 722.143 and shall be installed in accordance with ~~725.133 and 725.154~~722.135.

Exception No. 1: As provided for in 620.21 for elevators and similar equipment.

Exception No. 2: Other wiring methods and materials installed in accordance with the requirements of 725.3 shall be permitted to extend or replace the conductors and cables described in 725.179 and permitted by 725.130(B).

Exception No. 3: Bare Class 2 conductors shall be permitted as part of a listed intrusion protection system where installed in accordance with the listing instructions for the system.

Supplemental Information

<u>File Name</u>	<u>Description Approved</u>
NEC_725.130_B_FR9450.docx	Staff use

Submitter Information Verification

Committee: NEC-P03

Submission Date: Thu Jan 21 20:49:34 EST 2021

Committee Statement

Committee Statement: Using "in accordance with" without "the requirements" adds clarity and maintains consistency with 725.130(A).

The change is being made in the new Article 722, Cables for Power Limited Circuits, in Section 722.140(B) since Section 725.130 is deleted in Article 725 and moved to the new Article. If the new Article is rejected the change will be made to Section 725.130(B).

Response Message: FR-9450-NFPA 70-2021

Public Input No. 4112-NFPA 70-2020 [Section No. 725.130(B)]

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9538-NFPA 70-2021 [Detail]**

See attached Word file to add an informational note to 760.176 as shown below.

760.176 Listing and Marking of NPLFA Cables.

Non-power-limited fire alarm cables installed as wiring within buildings shall be listed in accordance with 760.176(A) and (B) and as being resistant to the spread of fire in accordance with 760.176(C) through (F), and shall be marked in accordance with 760.176(G). Cable used in a wet location shall be listed for use in wet locations or have a moisture-impervious metal sheath. Non-power-limited fire alarm cables shall have a temperature rating of not less than 60°C (140°F).

Informational Note: See UL 1425, Standard for Cables for Non-Power-Limited Fire-Alarm Circuits, for information on non-power-limited fire alarm cables.

Supplemental Information

<u>File Name</u>	<u>Description Approved</u>
NEC_760.176_FR9538.docx	Staff use

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 15:41:07 EST 2021

Committee Statement

Committee Statement: An informational note is added to Section 760.176 to reference UL 1425, Standard for Cables for Non-Power-Limited Fire-Alarm Circuits. This adds clarity and increases the usability of the NEC.

Response Message: FR-9538-NFPA 70-2021

[Public Input No. 345-NFPA 70-2020 \[Section No. 760.176 \[Excluding any Sub-Sections\]\]](#)

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.
Bassett, Douglas P.
Burlison, Steven D.
Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.



First Revision No. 9543-NFPA 70-2021 [Detail]

See revisions to 725.144(B).

(B) Use of Class 2-LP or Class 3-LP Cables to Transmit Power and Data.

Types CL3P-LP, CL2P-LP, CL3R-LP, CL2R-LP, CL3-LP, or CL2-LP shall be permitted to supply power to equipment from a power source with a rated current per conductor up to the marked current limit located immediately following the suffix "-LP" and shall be permitted to transmit data to the equipment. Where the number of bundled LP cables is 192 or less and the selected ampacity of the cables in accordance with Table 725.144 exceeds the marked current limit of the cable, the ampacity determined from the table shall be permitted to be used. For ambient temperatures above 30°C (86°F), the correction factors of Table 310.15(B)(1)(1) or Equation 310.15(B) shall apply. The Class 2-LP and Class 3-LP cables shall comply with the following, as applicable:

- (1) Cables with the suffix "-LP" shall be permitted to be installed in bundles, raceways, cable trays, communications raceways, and cable routing assemblies.
- (2) Cables with the suffix "-LP" and a marked current limit shall follow the substitution hierarchy of ~~Table 725.154 and Figure 725.154(A)~~ 722.135(E) for the cable type without the suffix "-LP" and without the marked current limit.
- (3) System design shall be permitted by qualified persons under engineering supervision.

Informational Note: An example of a limited power (LP) cable is a cable marked Type CL2-LP(0.5A), 23 AWG the marking on a 23 AWG, 4-pair, Class 2 cable rated 75°C with an LP current rating of 0.6 amperes per conductor is "CL2-LP(0.6A) 75°C AWG 4-pair". See 722.179(A)(9).

Supplemental Information

<u>File Name</u>	<u>Description Approved</u>
NEC_725.144_B_FR9543.docx	Staff use

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 16:43:42 EST 2021

Committee Statement

Committee Statement: A reference to the required temperature rating marking of LP cables should be included to be complete and consistent with typical LP cable markings. This reference will clarify that the bundle size and ampacity values are dependent on cable temperature rating.

See 722.179(B)(4) for cable temperature marking requirements.

First revision TG2-48 adds the same text to the informational note in 725.179.

Response Message: FR-9543-NFPA 70-2021

Public Input No. 1722-NFPA 70-2020 [Section No. 725.144(B)]

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

17 Affirmative All

3 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Affirmative with Comment

Jones, Chad M.

Editorial: informational note after item 3 is missing '23' in the example marking. "75C AWG" should be "75C 23 AWG"

Tellas, Ronald

agreed.

Zimmerman, George Allan

editorial - if FR-9582 fails, the references under '2' and in the informational note will need to be changed from pointing to the new (FR-9582) article 722 to 725.

**First Revision No. 9547-NFPA 70-2021 [Detail]**

See revisions to 725.179.

Informational Note: An example of the marking on a 23 AWG, 4-pair, Class 2 cable rated 75°C with an LP current rating of 0.6 amperes per conductor is "CL2-LP(0.6A) 75°C 23 AWG 4-pair."

Supplemental Information

<u>File Name</u>	<u>Description Approved</u>
NEC_725.179_FR9547.docx	Staff Use

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 17:12:31 EST 2021

Committee Statement

Committee Statement: The informational note is being added to provide readability of the code.

Response Message: FR-9547-NFPA 70-2021

Public Input No. 343-NFPA 70-2020 [Section No. 725.179 [Excluding any Sub-Sections]]

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Jones, Chad M.

this section is 100% duplicated in 722.179(A)(9), as FR9582 moved this text there. 725.179 should be deleted.
also 725.160 should be deleted as it should be contained in 722.

Tellas, Ronald
agreed.

**First Revision No. 9575-NFPA 70-2021 [Detail]**

725.3 Other Articles.

current (F) Motor Control Circuits.

~~Article 430, Part VI, where~~ Motor control circuit ~~stapped~~ from the load side of the motor branch-circuit protective device(s) as specified in 430.72(A) shall comply with Part IV of Article 430.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Sat Jan 23 18:48:09 EST 2021

Committee Statement

Committee Statement: CMP3 reaffirms the editorial changes provide clarity. No technical substantiation was provided for the non-editorial changes. The language revised within the public input for 725.3(B) repeats requirements from Section 300.21. Section 725.3(F) is revised to add clarity and comply with the requirement in the NEC Style Manual to use complete sentences. 725.3(A) has been moved to the new Class 1 Article 724 and is revised in the new article under public input 1693. 725.3(B) is unchanged as the existing wording complies with the style manual and is clear as written.

Response Message: FR-9575-NFPA 70-2021

[Public Input No. 1746-NFPA 70-2020 \[Section No. 725.3\]](#)

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.

Affirmative with Comment

Tellas, Ronald
agreed.
Zimmerman, George Allan
editorial - Motorcontrol should be 2 words - Motor control.

**First Revision No. 9626-NFPA 70-2021 [Detail]**

Move the Circuit Marking content from 725.124 to 725.121(C).

(C) Marking.

The equipment supplying the circuits shall be durably marked where plainly visible to indicate each circuit that is a Class 2 or Class 3 circuit. The power sources for limited power circuits in 725.60(A)(3), limited power circuits for listed audio/video equipment, listed information technology equipment, listed communications equipment, and listed industrial equipment in 725.60(A)(4) shall have a label indicating the maximum voltage and rated current output per conductor for each connection point on the power source. Where multiple connection points have the same rating, a single label shall be permitted to be used. For equipment with a rated current per conductor less than 0.3 amperes, the effective date shall be January 1, 2021.

Informational Note No. 1: Rated current for power sources covered in 725.144 is the output current per conductor the power source is designed to deliver to an operational load at normal operating conditions, as declared by the manufacturer.

Informational Note No. 2: An example of a label is "52V @ 0.433A, 57V MAX" for an IEEE 802.3 compliant Class 8 power source.

~~725.124 Circuit Marking.~~

~~The equipment supplying the circuits shall be durably marked where plainly visible to indicate each circuit that is a Class 2 or Class 3 circuit.~~

Supplemental Information

<u>File Name</u>	<u>Description</u> <u>Approved</u>
NEC_725.124_FR9626.docx	For staff use

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Wed Feb 03 16:53:12 EST 2021

Committee Statement

Committee Statement: Relocate Circuit Marking language from 725.124 to 725.121(C) to eliminate duplication.

Response Message: FR-9626-NFPA 70-2021

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Jones, Chad M.

This FR moves 725.124 to 725.121(C). But 725.121 was renumbered to 725.60. I don't remember the panel making this change. Regardless, a note stating that 725.121 was renumbered to 725.60 would be helpful to the reader and for future readers trying to recreate what changes were made.

Tellas, Ronald

agreed.

**First Revision No. 9627-NFPA 70-2021 [Detail]**

Add as last row to new Table 305.7.

Insulated Bus Pipe: Type IBP	0-35,000 ac	Article 369
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Submitter Information Verification

Committee: NEC-P03

Submittal Date: Wed Feb 10 11:22:39 EST 2021

Committee Statement

Committee Statement: This revision allows Insulated Bus Pipe as a permitted aboveground wiring method. This FR is contingent upon CMP 8 accepting Article 368 as a new article on Insulated Bus Pipe (PI 2589). The proposed new article would require IBP to be listed, installed, supported, terminated and tested in accordance with the manufacturer's instructions. If public input 2589 is resolved by CMP 8, this FR will be rescinded.

Response Message: FR-9627-NFPA 70-2021

[Public Input No. 2590-NFPA 70-2020 \[Section No. 300.37\]](#)

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Jones, Chad M.

The panel statement only addresses the addition of "listed Insulated Bus Pipe (IBP)" to the text in the 300.37. FR 9606 moved this text to 305.7 and turned this text into a table. The substantiation should mention this as a service to the reader.

Tellas, Ronald

agreed.

**First Revision No. 9555-NFPA 70-2021 [Definition: Circuit Integrity (CI) Cable.]****Circuit Integrity (CI) Cable.**

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

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

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 20:53:57 EST 2021

Committee Statement

Committee Statement: The current definition does not refer to other uses like fire alarm cables, communications cables, or fiber optic cables which all are permitted in their respective articles to use the (-CI) suffix.

Response Message: FR-9555-NFPA 70-2021

Public Input No. 849-NFPA 70-2020 [Definition: Circuit Integrity (CI) Cable.]

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Horner, Raymond W.

NEMA supports the addition of Fire-Resistive Cable System but there was not substantiation to keep Electrical Circuit Protective System. When 2-hour fire resistive cables were first introduced into the NEC, UL called these systems "Electrical Circuit Protective System" and they were tested to UL 2196. In 2012, UL withdraw all listed cables under this classification and renamed the new listing cables as a Fire-Resistive Cable System. Electrical Circuit Protective System should be removed from this section of the NEC.

Tellas, Ronald

agreed.

**First Revision No. 9556-NFPA 70-2021 [Definition: Class 1 Circuit.]****Class 1 Circuit.**

The portion of the wiring system between the load side of the ~~overcurrent device or power-limited~~ supply Class 1 power source and the connected equipment. (CMP-3)

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

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 21:05:50 EST 2021

Committee Statement

Committee Statement: Class 1 circuits as covered by the new Class 1 article are limited to 30 volts and 1000 volt-amperes. Non-power limited Class 1 remote-control and signaling circuits, as described in previous editions of the NEC, are branch circuits and the installation requirements for these circuits are in the first four Chapters of the NEC. Therefore these have been eliminated from the Class 1 article. This revised definition will clarify how to identify a Class 1 circuit.

The informational note is not necessary because the requirement to limit voltage and volt-amperes is contained in the new Article for Class 1 circuits.

Class 1 circuits are now only power limited circuits. Non-power limited Class 1 circuits have been eliminated since these circuits are covered by the requirements in chapters 1 through 4.

Response Message: FR-9556-NFPA 70-2021

[Public Input No. 3476-NFPA 70-2020 \[Definition: Class 1 Circuit.\]](#)

[Public Input No. 3871-NFPA 70-2020 \[Definition: Class 1 Circuit.\]](#)

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9557-NFPA 70-2021 [Definition: Remote-Control Circuit.]****Remote-Control Circuit, Power-Limited .**

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

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 21:14:34 EST 2021

Committee Statement

Committee Statement: Remote-control circuits have been a part of Article 725 for many years and can be power-limited Class 2 or Class 3 circuits or Class 1 circuits. Currently, Class 1 remote-control circuits can be power-limited or non-power limited and up to 600 volts. If a remote control circuit is a power-limited circuit, it would be installed in accordance with the appropriate power-limited Article. This would be Article 725 for Class 2 and Class 3 circuits and a proposed new Article for Class 1 circuits.

Non-power limited remote-control circuits are no longer covered by the above Articles since these circuits are covered by the requirements in chapters 1 through 4.

Separating power-limited and non-power-limited remote control circuit requirements now necessitates that they be differentiated by individual definitions. The existing definition is revised to add "power-limited".

A new definition for "remote-control branch circuits" makes it clear that these circuits are to be installed in accordance with the first four Chapters of the NEC.

Since these non-power-limited circuits are no longer covered in Chapter 7, CMP-3 recommends that this definition belongs with CMP-2 and perhaps a circuit description (from existing 725 part II) belongs in article 210.

Response Message: FR-9557-NFPA 70-2021

Public Input No. 3463-NFPA 70-2020 [Definition: Remote-Control Circuit.]

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.
Bassett, Douglas P.
Burlison, Steven D.
Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9559-NFPA 70-2021 [Definition: Signaling Circuit.]****Signaling Circuit, Power-Limited .**

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

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 21:28:29 EST 2021

Committee Statement

Committee Statement: Signaling circuits have been a part of Article 725 for many years and can be power-limited Class 2 or Class 3 circuits or Class 1 circuits. Currently, Class 1 signaling circuits can be power-limited or non-power limited and up to 600 volts. If a signaling circuit is a power-limited circuit, it would be installed in accordance with the appropriate power-limited Article. This would be Article 725 for Class 2 and Class 3 circuits and a proposed new Article for Class 1 circuits.

Non-power limited signaling circuits are no longer covered by the above Articles since these circuits are covered by the requirements in chapters 1 through 4.

Separating power-limited and non-power-limited signaling circuit requirements now necessitates that they be differentiated by individual definitions. The existing definition is revised to add "power-limited".

A new definition for "signaling branch circuits" makes it clear that these circuits are to be installed in accordance with the first four Chapters of the NEC.

Since these non-power-limited circuits are no longer covered in Chapter 7, CMP-3 recommends that this definition belongs with CMP-2 and perhaps a circuit description (from existing 725 part II) belongs in article 210.

Response Message: FR-9559-NFPA 70-2021

[Public Input No. 3471-NFPA 70-2020 \[Definition: Signaling Circuit.\]](#)

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.
Bassett, Douglas P.
Burlison, Steven D.
Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9558-NFPA 70-2021 [New Definition after Definition: Reconditioned.]****Remote-Control Circuit, Branch Circuit.**

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

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 21:22:28 EST 2021

Committee Statement

Committee Statement: Remote-control circuits have been a part of Article 725 for many years and can be power-limited Class 2 or Class 3 circuits or Class 1 circuits. Currently, Class 1 remote-control circuits can be power-limited or non-power limited and up to 600 volts. If a remote control circuit is a power-limited circuit, it would be installed in accordance with the appropriate power-limited Article. This would be Article 725 for Class 2 and Class 3 circuits and a proposed new Article for Class 1 circuits.

Non-power limited remote-control circuits are no longer covered by the above Articles since these circuits are covered by the requirements in chapters 1 through 4.

Separating power-limited and non-power-limited remote control circuit requirements now necessitates that they be differentiated by individual definitions. The existing definition is revised to add "power-limited".

A new definition for "remote-control branch circuits" makes it clear that these circuits are to be installed in accordance with the first four Chapters of the NEC.

Since these non-power-limited circuits are no longer covered in Chapter 7, CMP-3 recommends that this definition belongs with CMP-2 and perhaps a circuit description (from existing 725 part II) belongs in article 210.

Response Message: FR-9558-NFPA 70-2021

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.
Burlison, Steven D.
Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9560-NFPA 70-2021 [New Definition after Definition: Show Window.]****Signaling Circuit, Branch Circuit.**

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

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 21:30:56 EST 2021

Committee Statement

Committee Statement: Signaling circuits have been a part of Article 725 for many years and can be power-limited Class 2 or Class 3 circuits or Class 1 circuits. Currently, Class 1 signaling circuits can be power-limited or non-power limited and up to 600 volts. If a signaling circuit is a power-limited circuit, it would be installed in accordance with the appropriate power-limited Article. This would be Article 725 for Class 2 and Class 3 circuits and a proposed new Article for Class 1 circuits.

Non-power limited signaling circuits are no longer covered by the above Articles since these circuits are covered by the requirements in chapters 1 through 4.

Separating power-limited and non-power-limited signaling circuit requirements now necessitates that they be differentiated by individual definitions. The existing definition is revised to add "power-limited".

A new definition for "signaling branch circuits" makes it clear that these circuits are to be installed in accordance with the first four Chapters of the NEC.

Since these non-power-limited circuits are no longer covered in Chapter 7, CMP-3 recommends that this definition belongs with CMP-2 and perhaps a circuit description (from existing 725 part II) belongs in article 210.

Response Message: FR-9560-NFPA 70-2021

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Affirmative with Comment

Tellas, Ronald

agreed.

Zimmerman, George Allan

editorial - "Signaling Circuit, Branch Circuit" seems redundant with the word circuit. the committee statement says the new definition is "signaling branch circuit", which, I think should be "Signaling, Branch Circuit"



First Revision No. 9269-NFPA 70-2021 [Section No. 300.3(B) [Excluding any Sub-Sections]]

All conductors of the same circuit and, where used, the grounded conductor and all equipment grounding conductors and bonding conductors shall be contained within the same raceway, conduit body , auxiliary gutter, cable tray, cablebus assembly, trench, cable, or cord, unless otherwise permitted in accordance with 300.3(B)(1) through (B)(4).

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Mon Jan 18 17:58:05 EST 2021

Committee Statement

Committee Statement: Conduit bodies are not specifically mentioned in the existing language however, the requirements for them are the same. Adding “conduit body” into this section will provide language to address any possible confusion as to applying the rule.

Response Message: FR-9269-NFPA 70-2021

Public Input No. 378-NFPA 70-2020 [Section No. 300.3(B) [Excluding any Sub-Sections]]

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.



First Revision No. 9370-NFPA 70-2021 [Section No. 300.4(A)(1)]

(1) Bored Holes.

In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed through bored holes in joists, rafters, or wood members, holes shall be bored so that the edge of the hole is not less than 32 mm (1¼ in.) from the nearest edge of the wood member. Where this distance cannot be maintained, the cable or raceway shall be protected from penetration by screws or nails by a steel plate(s) or bushing(s), at least 1.6 mm (⅙ in.) thick, and of appropriate length and width installed to cover the area of the wiring.

Exception No. 1: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid nonmetallic PVC conduit, RTRC, or electrical metallic tubing.

Exception No. 2: A listed and marked steel plate less than 1.6 mm (⅙ in.) thick that provides equal or better protection against nail or screw penetration shall be permitted.

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
FR_to_update_in_file..docx	Updated language. For staff use	

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Wed Jan 20 15:33:56 EST 2021

Committee Statement

Committee Statement: The Public Input looked to replace rigid non-metallic conduit with type PVC Conduit. The committee made the change to rigid PVC Conduit and RTRC because both are rigid non-metallic conduits that could be used in this situation.

Response Message: FR-9370-NFPA 70-2021

[Public Input No. 4454-NFPA 70-2020 \[Section No. 300.4\(A\)\(1\)\]](#)

[Public Input No. 2403-NFPA 70-2020 \[Section No. 300.4\(A\)\(1\)\]](#)

[Public Input No. 4476-NFPA 70-2020 \[Section No. 300.4\(A\)\(2\)\]](#)

[Public Input No. 4478-NFPA 70-2020 \[Section No. 300.4\(D\)\]](#)

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9408-NFPA 70-2021 [Section No. 300.4(E)]**[Detail FR-9375](#)[Detail FR-9382](#)**(E) Cables, Raceways, or Boxes Installed in or Under Metal-Corrugated Roof Decking.**

A cable, raceway, or box, installed in exposed or concealed locations under metal-corrugated sheet roof decking, shall be installed and supported so there is not less than 38 mm (1½ in.) measured from the lowest surface of the roof decking to the top of the cable, raceway, or box. A cable, raceway, or box shall not be installed in concealed locations in metal-corrugated, sheet decking-type roof.

Informational Note: Roof decking material is often repaired or replaced after the initial raceway or cabling and roofing installation and may might be penetrated by the screws or other mechanical devices designed to provide “hold down” strength of the waterproof membrane or roof insulating material.

Exception No. 1: Rigid metal conduit and intermediate metal conduit, with malleable iron fittings or boxes, shall not be required to comply with 300.4(E).

Exception No. 2: The 38 mm (1½ in.) spacing is not required where metal-corrugated sheet roof decking is covered with a minimum thickness 50 mm (2 in.) concrete slab, measured from the top of the corrugated roofing.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Thu Jan 21 12:35:11 EST 2021

Committee Statement

Committee Statement: The added exception will recognize different construction techniques available that utilize poured concrete on top of the metal roof decking. The addition of the concrete reduces the risk of screws penetrating into the wiring methods below the deck.

Response Message: FR-9408-NFPA 70-2021

[Public Input No. 369-NFPA 70-2020 \[Section No. 300.4\(E\)\]](#)

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.
Bassett, Douglas P.
Burlison, Steven D.
Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9377-NFPA 70-2021 [Section No. 300.4(F)]****(F) Cables and Raceways Installed in Shallow Grooves.**

Cable- or raceway-type wiring methods installed in a groove, to be covered by wallboard, siding, paneling, carpeting, or similar finish, shall be protected by 1.6 mm ($\frac{1}{16}$ in.) thick steel plate, sleeve, or equivalent or by not less than 32-mm ($\frac{1}{4}$ -in.) free space for the full length of the groove in which the cable or raceway is installed.

Exception No. 1: Steel plates, sleeves, or the equivalent shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid ~~nonmetallic~~ conduit PVC conduit, RTRC, or electrical metallic tubing.

Exception No. 2: A listed and marked steel plate less than 1.6 mm ($\frac{1}{16}$ in.) thick that provides equal or better protection against nail or screw penetration shall be permitted.

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
FR_9377_to_update_in_file..docx	See Tracked Changes. For staff use	

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Wed Jan 20 16:58:00 EST 2021

Committee Statement

Committee Statement: The Public Input looked to replace rigid non-metallic conduit with type PVC Conduit. The committee made the change to rigid PVC Conduit and RTRC because both are rigid non-metallic conduits that would be used in this situation.

Response Message: FR-9377-NFPA 70-2021

[Public Input No. 4480-NFPA 70-2020 \[Section No. 300.4\(F\)\]](#)

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

17 Affirmative All

3 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.
Burlison, Steven D.
Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Robert A.
Krueger, Kyle
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Jones, Chad M.

lost the word conduit in the edits. "rigid PVC" should be "Rigid PVC conduit"

Mikloiche, Timothy J.

It appears that "PVC,RTRC" was added instead of "Rig1d PVC conduit"

Tellas, Ronald

agreed.

**First Revision No. 9319-NFPA 70-2021 [Section No. 300.4(G)]****(G) Fittings.**

Where raceways contain 4 AWG or larger insulated circuit conductors, and these conductors enter a cabinet, a box, an enclosure, or a raceway, prior to the installation of conductors, the conductors shall be protected in accordance with any of the following:

- (1) An identified fitting providing a smoothly rounded insulating surface
- (2) A listed metal fitting that has smoothly rounded edges
- (3) Separation from the fitting or raceway using an identified insulating material that is securely fastened in place
- (4) Threaded hubs or bosses that are an integral part of a cabinet, box, enclosure, or raceway providing a smoothly rounded or flared entry for conductors

Conduit bushings constructed wholly of insulating material shall not be used to secure a fitting or raceway. The insulating fitting or insulating material shall have a temperature rating not less than the insulation temperature rating of the installed conductors.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Tue Jan 19 17:45:54 EST 2021

Committee Statement

Committee Statement: The text has been revised to make it clear that the protective fitting needs to be installed prior to the installation of the conductors.

Response Message: FR-9319-NFPA 70-2021

[Public Input No. 1412-NFPA 70-2020 \[Section No. 300.4\(G\)\]](#)

[Public Input No. 2031-NFPA 70-2020 \[Section No. 300.4\(G\)\]](#)

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.
Burlison, Steven D.
Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.



First Revision No. 9323-NFPA 70-2021 [Section No. 300.5(A)]

(A) Minimum Cover Requirements.

Direct-buried cable, conduit, or other raceways shall be installed to meet the minimum cover requirements of Table 300.5.

Table 300.5 Minimum Cover Requirements, 0 to 1000 Volts ac, 1500 Volts dc , Nominal, Burial in Millimeters (Inches)

<u>Location of Wiring Method or Circuit</u>	<u>Type of Wiring Method or Circuit</u>									
	<u>Column 1</u> <u>Direct Burial</u> <u>Cables or</u> <u>Conductors</u>		<u>Column 2</u> <u>Electrical</u> <u>Metallic</u> <u>Tubing,</u> <u>Rigid Metal</u> <u>Conduit, or</u> <u>Intermediate</u> <u>Metal</u> <u>Conduit</u>		<u>Column 3</u> <u>Nonmetallic</u> <u>Raceways</u> <u>Listed for</u> <u>Direct Burial</u> <u>Without</u> <u>Concrete</u> <u>Encasement or</u> <u>Other</u> <u>Approved</u> <u>Raceways</u>		<u>Column 4</u> <u>Residential</u> <u>Branch Circuits</u> <u>Rated 120 Volts</u> <u>or Less with</u> <u>GFCI</u> <u>Protection and</u> <u>Maximum</u> <u>Overcurrent</u> <u>Protection of</u> <u>20 Amperes</u>		<u>Column 5</u> <u>Circuits for</u> <u>Control of</u> <u>Irrigation and</u> <u>Landscape</u> <u>Lighting</u> <u>Limited to Not</u> <u>More Than</u> <u>30 Volts and</u> <u>Installed with</u> <u>Type UF or in</u> <u>Other Identified</u> <u>Cable or</u> <u>Raceway</u>	
	<u>mm</u>	<u>in.</u>	<u>mm</u>	<u>in.</u>	<u>mm</u>	<u>in.</u>	<u>mm</u>	<u>in.</u>	<u>mm</u>	<u>in.</u>
All locations not specified below	600	24	150	6	450	18	300	12	150 ^a , b 1,2	6 ^a , b 1,2
In trench below 50 mm (2 in.) thick concrete or equivalent	450	18	150	6	300	12	150	6	150	6
Under a building (in raceway or Type MC or Type MI cable identified for direct burial)	0	0	0	0	0	0	0	0 (in raceway or Type MC or Type MI cable identified for direct burial)	0	0 (in raceway or Type MC or Type MI cable identified for direct burial)
Under minimum of 102 mm (4 in.) thick concrete exterior slab with no vehicular traffic and the slab extending not less than 152 mm (6 in.) beyond the underground installation	450	18	100	4	100	4	150 (direct burial) 100 (in raceway)	6 4	150 (direct burial) 100 (in raceway)	6 4
Under streets, highways, roads, alleys, driveways, and parking lots	600	24	600	24	600	24	600	24	600	24
One- and two-family dwelling driveways and outdoor parking areas, and used only for dwelling-related purposes	450	18	450	18	450	18	300	12	450	18
In or under airport runways, including adjacent areas where trespassing is	450	18	450	18	450	18	450	18	450	18

prohibited

a 1 A lesser depth shall be permitted where specified in the installation instructions of a listed low-voltage lighting system.

b 2 A depth of 150 mm (6 in.) shall be permitted for pool, spa, and fountain lighting, installed in a nonmetallic raceway, limited to not more than 30 volts where part of a listed low-voltage lighting system.

Notes:

1. Cover is defined as the shortest distance in mm (in.) measured between a point on the top surface of any direct-buried conductor, cable, conduit, or other raceway and the top surface of finished grade, concrete, or similar cover.

2. Raceways approved for burial only where concrete encased shall require a concrete envelope not less than 50 mm (2 in.) thick.

3. Lesser depths shall be permitted where cables and conductors rise for terminations or splices or where access is otherwise required.

4. Where one of the wiring method types listed in Columns 1 through 3 is used for one of the circuit types in Columns 4 and 5, the shallowest depth of burial shall be permitted.

5. Where solid rock prevents compliance with the cover depths specified in this table, the wiring shall be installed in a metal raceway, or a nonmetallic raceway permitted for direct burial. The raceways shall be covered by a minimum of 50 mm (2 in.) of concrete extending down to rock.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Tue Jan 19 19:59:02 EST 2021

Committee Statement

Committee Statement: The current UL directory recognizes the use of Stainless Steel, Aluminum (when provided with approved supplemental corrosion protection), and Galvanized EMT for direct burial applications. As such, column 2 was revised to clarify that Electrical Metallic Tubing (EMT) is included in the list of "Other Approved Raceways".

Response Message: FR-9323-NFPA 70-2021

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

15 Affirmative All

5 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Ivans, Randolph J.

Iverson, Donald R.

Jones, Robert A.

Krueger, Kyle

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Burris, Jay

EMT should have been added to Table 300.5 Column 3 which includes the list of "Other Approved Raceways", not Column 2.

Horner, Raymond W.

An administrative error put EMT in column 2 instead of column 3 where it belongs

Jones, Chad M.

panel statement covers addition of EMT to column 2. Other changes made that have no explanation or substantiation. Title was modified to include "ac, 1500V dc" - what is the source of this change? where is the substantiation? I don't recall the panel making this change. I'm not saying the change is incorrect, I'm saying we've not documented and justified the change.

Mikloiche, Timothy J.

Affirmative vote on the addition of EMT to the table, however, I do not have in my notes a change to the heading "ac, 1500 volts dc"

Tellas, Ronald

agreed.

**First Revision No. 9357-NFPA 70-2021 [Section No. 300.6]****300.6 Protection Against Corrosion and Deterioration.**

Raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, meter socket enclosures, elbows, couplings, fittings, supports, and support hardware shall be of materials suitable for the environment in which they are to be installed.

(A) Ferrous Metal Equipment.

Ferrous metal raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, meter socket enclosures, metal elbows, couplings, nipples, fittings, supports, and support hardware shall be suitably protected against corrosion inside and outside (except threads at joints) by a coating of approved corrosion-resistant material. Where corrosion protection is necessary and the conduit is threaded in the field, the threads shall be coated with an approved electrically conductive, corrosion-resistant compound.

Informational Note: Field-cut threads are those threads that are cut in conduit, elbows, or nipples anywhere other than at the factory where the product is listed.

Exception: Stainless steel shall not be required to have protective coatings.

(1) Protected from Corrosion Solely by Enamel.

Where protected from corrosion solely by enamel, ferrous metal raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, meter socket enclosures, metal elbows, couplings, nipples, fittings, supports, and support hardware shall not be used outdoors or in wet locations as described in 300.6(D).

(2) Organic Coatings on Boxes or Cabinets.

Where boxes, ~~or~~ cabinets, ~~or~~ meter socket enclosures, have an approved system of organic coatings and are marked "Raintight," "Rainproof," or "Outdoor Type," they shall be permitted outdoors.

(3) In Concrete or in Direct Contact with the Earth.

Ferrous metal raceways, cable armor, boxes, cable sheathing, cabinets, meter socket enclosures, elbows, couplings, nipples, fittings, supports, and support hardware shall be permitted to be installed in concrete or in direct contact with the earth, or in areas subject to severe corrosive influences where made of material approved for the condition, or where provided with corrosion protection approved for the condition.

(B) Aluminum Metal Equipment.

Aluminum raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, meter socket enclosures, elbows, couplings, nipples, fittings, supports, and support hardware embedded or encased in concrete or in direct contact with the earth shall be provided with supplementary corrosion protection.

(C) Nonmetallic Equipment.

Nonmetallic raceways, cable trays, cablebus, auxiliary gutters, boxes, cables with a nonmetallic outer jacket and internal metal armor or jacket, cable sheathing, cabinets, meter socket enclosures, elbows, couplings, nipples, fittings, supports, and support hardware shall be made of material approved for the condition and shall comply with 300.6(C)(1) and (C)(2) as applicable to the specific installation.

(1) Exposed to Sunlight.

Where exposed to sunlight, the materials shall be listed as sunlight resistant or shall be identified as sunlight resistant.

(2) Chemical Exposure.

Where subject to exposure to chemical solvents, vapors, splashing, or immersion, materials or coatings shall either be inherently resistant to chemicals based on their listing or be identified for the specific chemical reagent.

(D) Indoor Wet Locations.

In portions of dairy processing facilities, laundries, canneries, and other indoor wet locations, and in locations where walls are frequently washed or where there are surfaces of absorbent materials, such as damp paper or wood, the entire wiring system, where installed exposed, including all boxes, cabinets, meter socket enclosures, fittings, raceways, and cable used therewith, shall be mounted so that there is at least a 6-mm (1/4-in.) airspace between it and the wall or supporting surface.

Exception: Nonmetallic raceways, boxes, and fittings shall be permitted to be installed without the airspace on a concrete, masonry, tile, or similar surface.

Informational Note: In general, areas where acids and alkali chemicals are handled and stored may might present such corrosive conditions, particularly when wet or damp. Severe corrosive conditions may might also be present in portions of meatpacking plants, tanneries, glue houses, and some stables; in installations immediately adjacent to a seashore and swimming pool areas; in areas where chemical deicers are used; and in storage cellars or rooms for hides, casings, fertilizer, salt, and bulk chemicals.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Wed Jan 20 13:51:17 EST 2021

Committee Statement

Committee Statement: Although Section 300.6 addresses corrosion resistance requirements for boxes and cabinets, Article 312 includes cabinets, (cutout) boxes, and (meter-socket) enclosures. Correlating with Article 312, the encompassing term "meter socket enclosures" is added to 300.6 charging text, 300.6(A), 300.6(A)(1), 300.6(A)(2), 300.6(A)(3), 300.6(B), 300.6(C), and 300.6(D), all following occurrences of "cabinets".

Response Message: FR-9357-NFPA 70-2021

[Public Input No. 2438-NFPA 70-2020 \[Section No. 300.6\]](#)

[Public Input No. 3039-NFPA 70-2020 \[Section No. 300.6\]](#)

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Jones, Chad M.

Editorial: 300.6(A)(2): delete the comma after the added word "enclosures".

Tellas, Ronald
agreed.

**First Revision No. 9364-NFPA 70-2021 [Section No. 300.7(B)]****(B) Expansion, Expansion-Deflection, and Deflection Fittings.**

Raceways shall be provided with expansion, expansion-deflection, or deflection fittings where necessary to compensate for thermal expansion, deflection, and contraction.

Informational Note No. 1: Table 352.44(A) and Table 355.44 provide the expansion information for polyvinyl chloride (PVC) and for reinforced thermosetting resin conduit (RTRC), respectively. A nominal number for steel conduit can be determined by multiplying the expansion length in Table 352.44(A) by 0.20. The coefficient of expansion for steel electrical metallic tubing, intermediate metal conduit, and rigid metal conduit is 1.170×10^{-5} (0.0000117 mm per mm of conduit for each °C in temperature change) [0.650×10^{-5} (0.0000065 in. per inch in. of conduit for each °F in temperature change)].

A nominal number for aluminum conduit and aluminum electrical metallic tubing can be determined by multiplying the expansion length in Table 352.44(A) by 0.40. The coefficient of expansion for aluminum electrical metallic tubing and aluminum rigid metal conduit is 2.34×10^{-5} (0.0000234 mm per mm of conduit for each °C in temperature change) [1.30×10^{-5} (0.000013 in. per inch in. of conduit for each °F in temperature change)].

Informational Note No. 2: See NEMA FB 2.40-2019, *Installation Guidelines for Expansion and Expansion/Deflection Fittings*, for further information on expansion and expansion deflection fittings.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Wed Jan 20 14:52:16 EST 2021

Committee Statement

Committee Statement: A new informational note is added informing that an installation guideline for expansion and expansion deflection fittings is available.

Response Message: FR-9364-NFPA 70-2021

Public Input No. 1268-NFPA 70-2020 [Section No. 300.7(B)]

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Jones, Chad M.

editorial: informational note 2: delete the extra space after the title. "fittings ,"

Tellas, Ronald

agreed.

**First Revision No. 9369-NFPA 70-2021 [Section No. 300.9]****300.9** Raceways in Wet Locations Above~~grade~~ Grade .

Where raceways are installed in wet locations above~~grade~~ grade , the interior of these raceways shall be considered to be a wet location. Insulated conductors and cables installed in raceways in wet locations above grade grade shall comply with 310.10(C).

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Wed Jan 20 15:27:34 EST 2021

Committee Statement

Committee Statement: "Abovegrade" was replaced with "Above Grade" in Section 300.9 to be consistent with the language in the NEC.

Response Message: FR-9369-NFPA 70-2021

Public Input No. 988-NFPA 70-2020 [Global Input]

Ballot Results

✓ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9225-NFPA 70-2021 [Section No. 300.10]****300.10** Electrical Continuity of Metal Raceways, Cable Armor, and Enclosures.

Metal raceways, cable armor, and other metal enclosures for conductors shall be metallically joined together into a continuous electrical conductor and shall be connected to all boxes, fittings, and cabinets ~~so as~~ to provide effective electrical continuity. Unless specifically permitted elsewhere in this *Code*, raceways and cable assemblies shall be mechanically secured to boxes, fittings, cabinets, and other enclosures.

Exception No. 1: Short sections of raceways used to provide support or protection of cable assemblies from physical damage shall not be required to be made electrically continuous.

Exception No. 2: Equipment enclosures to be isolated, as permitted by 250.96(B), shall not be required to be metallically joined to the metal raceway.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Mon Jan 18 13:30:29 EST 2021

Committee Statement

Committee Statement: CMP3 reaffirms that Section 300.10 covers cable armor and therefore it is appropriate to include cable armor in the title for clarity.

Response Message: FR-9225-NFPA 70-2021

Public Input No. 146-NFPA 70-2019 [Section No. 300.10]

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9230-NFPA 70-2021 [Section No. 300.11(C)]****(C) Raceways Used as Means of Support.**

Raceways shall be used only as a means of support for other raceways, cables, or nonelectrical equipment under any of the following conditions:

- (1) Where the raceway or means of support is identified as a means of support
- (2) Where the raceway contains power supply conductors for electrically controlled equipment and is used to support Class 2 or Class 3 circuit conductors or cables that are solely for the purpose of connection to the equipment control circuits
- (3) Where the raceway is used to support boxes or conduit bodies in accordance with 314.23 or to support luminaires in accordance with 410.36(E)

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Mon Jan 18 15:15:18 EST 2021

Committee Statement

Committee Statement: This revision includes Class 3 in 300.11(C)(2) and aligns this section with 725.143.

Response Message: FR-9230-NFPA 70-2021

[Public Input No. 1211-NFPA 70-2020 \[Section No. 300.11\(C\)\]](#)

[Public Input No. 3718-NFPA 70-2020 \[Section No. 300.11\(C\)\]](#)

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9233-NFPA 70-2021 [Section No. 300.14]****300.14** Length of Free Conductors at Outlets, Junctions, and Switch Points.

At least 150 mm (6 in.) of free conductor, measured from the point in the box where it emerges from its raceway or cable sheath, shall be left at each outlet, junction, and switch point for splices or the connection of luminaires or devices. The 150 mm (6 in.) free conductor is permitted to be spliced or unspliced. Where the opening to an outlet, junction, or switch point is less than 200 mm (8 in.) in any dimension, each conductor shall be long enough to extend at least 75 mm (3 in.) outside the opening.

Exception: Conductors that are not spliced or terminated at the outlet, junction, or switch point shall not be required to comply with 300.14.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Mon Jan 18 15:22:55 EST 2021

Committee Statement

Committee Statement: The free conductor is permitted to be a splice. The addition of this text makes that clear and free of interpretation.

Response Message: FR-9233-NFPA 70-2021

[Public Input No. 1407-NFPA 70-2020 \[Section No. 300.14\]](#)

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9249-NFPA 70-2021 [Section No. 300.15(G)]****(G) Direct-Buried Conductors and Cables .**

As permitted in 300.5(E), a box or conduit body shall not be required for splices and taps in direct-buried conductors and cables.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Mon Jan 18 16:55:49 EST 2021

Committee Statement

Committee Statement: The language in the section does reference cables, which as indicated in the public input, is not currently in the section heading. Adding the words “and cables” into the section heading, while not a technical change, will clarify the intent of the requirement.

Response Message: FR-9249-NFPA 70-2021

Public Input No. 534-NFPA 70-2020 [Section No. 300.15(G)]

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.



First Revision No. 9241-NFPA 70-2021 [Section No. 300.15 [Excluding any Sub-Sections]]

A box shall be installed at each outlet and switch point for concealed knob-and-tube wiring.

Fittings and connectors shall be used only with the specific wiring methods for which they are designed and listed.

Where the wiring method is conduit, tubing, Type AC cable, Type MC cable, Type MI cable, nonmetallic-sheathed cable, or other cables, a box or conduit body shall be installed at each conductor splice point, outlet point, switch point, conductor splice point, conductor junction point, conductor termination point, wiring method transition point, or conductor pull point, unless otherwise permitted in 300.15(A) through (L).

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Mon Jan 18 16:09:58 EST 2021

Committee Statement

Committee Statement: Clarification that these are conductor splice, termination, junction, and pull points was needed and this revision will eliminate misinterpretations. The wording “wiring method transition points” has been added to the end of the new language to provide direction on handling installations where wiring methods change from one type to another. As wiring method transition fittings are covered by Section 300.15(F), this type of point in the wiring system must be included in the charging language of Section 300.15. If the wiring methods transition fittings was lost from being covered in the charging paragraph of Section 300.15 then the enforcement of wiring method transition fittings as being listed for the wiring methods they are used with will no longer apply to these points on the wiring system.

Response Message: FR-9241-NFPA 70-2021

[Public Input No. 3334-NFPA 70-2020 \[Section No. 300.15 \[Excluding any Sub-Sections\]\]](#)

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9256-NFPA 70-2021 [Section No. 300.17]****300.17** Number and Size of Conductors and Cables in Raceway.

The number and size of conductors and cables in any raceway shall not be more than will permit dissipation of the heat and ready installation or withdrawal of the conductors or cables without damage to the conductors or cables, or to their insulation.

Informational Note: See the following sections of this *Code*: intermediate metal conduit, 342.22; rigid metal conduit, 344.22; flexible metal conduit, 348.22; liquidtight flexible metal conduit, 350.22; PVC conduit, 352.22; HDPE conduit, 353.22; RTRC, 355.22; liquidtight nonmetallic flexible conduit, 356.22; electrical metallic tubing, 358.22; flexible metallic tubing, 360.22; electrical nonmetallic tubing, 362.22; cellular concrete floor raceways, 372.22; cellular metal floor raceways, 374.22; metal wireways, 376.22; nonmetallic wireways, 378.22; surface metal raceways, 386.22; surface nonmetallic raceways, 388.22; underfloor raceways, 390.22; fixture wire, 402.7; theaters, 520.6; signs, 600.31(C); elevators, 620.33; audio signal processing, amplification, and reproduction equipment, 640.23(A) and 640.24; Class 1, Class 2, and Class 3 circuits, Article 725; fire alarm circuits, Article 760; and optical fiber cables and raceways, Article 770.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Mon Jan 18 17:22:33 EST 2021

Committee Statement

Committee Statement: Cables are permitted to be installed in raceways when permitted by the specific cable section. As cables may in fact become damaged during installation, by adding the wording “and cables” into the heading and section, it will become clear that cables must also meet this requirement.

Response Message: FR-9256-NFPA 70-2021

Public Input No. 535-NFPA 70-2020 [Section No. 300.17]

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9258-NFPA 70-2021 [Section No. 300.18]****300.18 Raceway Installations.****(A) Complete Runs.**

Raceways, other than busways, listed manufactured assemblies as identified in 604.100, or exposed raceways having hinged or removable covers, shall be installed complete between outlet, junction, or splicing points prior to the installation of conductors or cables. Where required to facilitate the installation of utilization equipment, the raceway shall be permitted to be initially installed without a terminating connection at the equipment. Prewired raceway assemblies shall be permitted only where specifically permitted in this Code for the applicable wiring method.

Exception: Short sections of raceways used to contain conductors or cable assemblies for protection from physical damage shall not be required to be installed complete between outlet, junction, or splicing points.

(B) Welding.

Metal raceways shall not be supported, terminated, or connected by welding to the raceway unless specifically designed to be or otherwise specifically permitted to be in this Code.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Mon Jan 18 17:28:15 EST 2021

Committee Statement

Committee Statement: As Panel 7 and Panel 8 added language covering listed manufactured assemblies, this change would align with those changes and aid with consistency. The wording "listed manufactured assemblies for use in Article 604" has been modified to "listed manufactured assemblies as identified in section 604.100" as referencing an entire code article is in conflict with the NEC Style Manual.

Cables are permitted to be installed in raceways when permitted by the specific cable section. As cables may become damaged during installation, adding the wording "and cables" into the section will make it clear that cables must also meet this requirement

Response Message: FR-9258-NFPA 70-2021

[Public Input No. 2841-NFPA 70-2020 \[Section No. 300.18\]](#)

[Public Input No. 536-NFPA 70-2020 \[Section No. 300.18\(A\)\]](#)

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9262-NFPA 70-2021 [Section No. 300.19(B)]****(B) Fire-Rated Resistive Cables and Conductors.**

Support methods and spacing intervals for fire-rated resistive cables and conductors shall comply with any restrictions provided in the listing of the electrical circuit protective system or fire-resistive cable system used and in no case shall exceed the values in Table 300.19(A).

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Mon Jan 18 17:36:39 EST 2021

Committee Statement

Committee Statement: As indicated in the public input, which was submitted by a member of the Correlating Committee Task Group for Circuit Integrity Cable, replacing “rated” with “resistive” as used in other sections of the NEC will add in usability and consistency.

A similar public input (PI No. 2140) from the same task group justified keeping both electrical circuit protective, and adding ‘or fire-resistive cable’. This result is correlated here.

Response Message: FR-9262-NFPA 70-2021

[Public Input No. 2098-NFPA 70-2020 \[Section No. 300.19\(B\)\]](#)

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters
2 Not Returned
19 Affirmative All
1 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.



First Revision No. 9265-NFPA 70-2021 [Section No. 300.22(C) [Excluding any Sub-Sections]]

This section shall apply to spaces not specifically fabricated for environmental air-handling purposes but used for air-handling purposes as a plenum. This section shall not apply to habitable rooms or areas of buildings, the prime purpose of which is not air handling.

Informational Note No. 1: The space over a hung ceiling used for environmental air-handling purposes is an example of the type of other space to which this section applies.

Informational Note No. 2: The phrase *other spaces used for environmental air (plenum)* as used in this section correlates with the use of the term *plenum* in NFPA 90A-2018 2021 , *Standard for the Installation of Air-Conditioning and Ventilating Systems*, and other mechanical codes where the plenum is used for return air purposes, as well as some other air-handling spaces.

Exception: This section shall not apply to the joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Mon Jan 18 17:49:11 EST 2021

Committee Statement

Committee Statement: NFPA 90A has recently been updated to the 2021 edition. The informational note is updated to reflect this.

Response Message: FR-9265-NFPA 70-2021

Public Input No. 678-NFPA 70-2020 [Section No. 300.22(C) [Excluding any Sub-Sections]]

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9267-NFPA 70-2021 [Section No. 300.25]****300.25 Exit Enclosures (Stair Towers).**

Where an exit enclosure is required to be separated from the building, only electrical wiring methods serving equipment permitted by the authority having jurisdiction in the exit enclosure shall be installed within the exit enclosure.

Exception: Where egress lighting is required on outside exterior doorways from the exit enclosure, luminaires shall be permitted to be supplied from the inside of the exit enclosure.

Informational Note: For See NFPA 101 -2021, *Life Safety Code*, 7.1.3.2.1(10)(b), for more information, refer to NFPA 101 -2018, *Life Safety Code*, 7.1.3.2.1(10)(b).

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Mon Jan 18 17:55:18 EST 2021

Committee Statement

Committee Statement: An exterior door off an exit enclosure is part of the means of egress. The exterior light for that door is typically fed from the circuit that feeds the lights in the exit enclosure. Adding this exception will provide clarity to explain that the exterior door lights can be supplied from the interior stairway lighting circuit.

Response Message: FR-9267-NFPA 70-2021

Public Input No. 808-NFPA 70-2020 [Section No. 300.25]

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.
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Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.



First Revision No. 9322-NFPA 70-2021 [Section No. 300.50(A)]

(A) General.

Underground conductors shall be identified for the voltage and conditions under which they are installed. Direct-burial cables shall comply with the provisions of 310.10(E). Conductors used for direct-burial applications shall be of a type identified for such use. Underground cables shall be installed in accordance with 305.15(A)(1), (A)(2), or (A)(3), and the installation shall meet the depth requirements of Table 305.15.

Table 305.15 Minimum Cover^a Requirements

Circuit Voltage	General Conditions (not otherwise specified)						Special Conditions (use if applicable)					
	Column 1		Column 2		Column 3		Column 4		Column 5		Column 6	
	Direct-Buried Cables ^{b 1}		Electrical Metallic Tubing, RTRC, PVC, and HDPE Conduit ^{c 2}		Rigid Metal Conduit and Intermediate Metal Conduit		Raceways Under Buildings or Exterior Concrete Slabs, 100 mm (4 in.) Minimum Thickness ^{d 3}		Cables in Airport Runways or Adjacent Areas Where Trespass Is Prohibited		Areas Subject to Vehicular Traffic, Such as Thoroughfares and Commercial Parking Areas	
	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
Over 1000 V ac, 1500 V dc, through 22 kV	750	30	450	18	150	6	100	4	450	18	600	24
Over 22 kV through 40 kV	900	36	600	24	150	6	100	4	450	18	600	24
Over 40 kV	1000	42	750	30	150	6	100	4	450	18	600	24

General Notes:

^a 1. Cover is shall be defined as the shortest distance in millimeters (inches) measured between a point on the top surface of any direct-buried conductor, cable, conduit, or other raceway and the top surface of finished grade, concrete, or similar cover.

4 2. Lesser depths shall be permitted where cables and conductors rise for terminations or splices or where access is otherwise required.

2 3. Where solid rock prevents compliance with the cover depths specified in this table, the wiring shall be installed in a metal or nonmetallic raceway permitted for direct burial. The raceways shall be covered by a minimum of 50 mm (2 in.) of concrete extending down to rock.

3 4. In industrial establishments, where conditions of maintenance and supervision ensure that qualified persons will service the installation, the minimum cover requirements, for other than rigid metal conduit and intermediate metal conduit, shall be permitted to be reduced 150 mm (6 in.) for each 50 mm (2 in.) of concrete or equivalent placed entirely within the trench over the underground installation.

Specific Footnotes:

^b 1 Underground direct-buried cables that are not encased or protected by concrete and are buried 750 mm (30 in.) or more below grade shall have their location identified by a warning ribbon that is placed in the trench at least 300 mm (12 in.) above the cables.

^c 2 Listed by a qualified testing agency as suitable for direct burial without encasement. All other nonmetallic systems shall require 50 mm (2 in.) of concrete or equivalent above conduit in addition to the table depth.

^d 3 The slab shall extend a minimum of 150 mm (6 in.) beyond the underground installation, and a warning ribbon or other effective means suitable for the conditions shall be placed above the underground installation.

(1) Shielded Cables and Nonshielded Cables in Metal-Sheathed Cable Assemblies.

Underground cables, including nonshielded, Type MC and moisture-impervious metal sheath cables, shall have those sheaths grounded through an effective grounding path meeting the requirements of 250.4(A)(5) or 250.4 (B)(4). They shall be direct buried or installed in raceways identified for the use.

(2) Industrial Establishments.

In industrial establishments, where conditions of maintenance and supervision ensure that only qualified persons service the installed cable, nonshielded single-conductor cables with insulation types up to 2000 volts that are listed for direct burial shall be permitted to be directly buried.

(3) Other Nonshielded Cables.

Other nonshielded cables not covered in 305.15(A)(1) or (A)(2) shall be installed in rigid metal conduit, intermediate metal conduit, or rigid nonmetallic conduit encased in not less than 75 mm (3 in.) of concrete.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Tue Jan 19 19:51:33 EST 2021

Committee Statement

Committee Statement: The current UL directory recognizes the use of Stainless Steel, Aluminum (when provided with approved supplemental corrosion protection), and Galvanized Electric Metallic Tubing (EMT) for direct burial applications. As such, column 2 was revised to clarify that EMT is included in the list of "Other Approved Raceways".

Response Message: FR-9322-NFPA 70-2021

[Public Input No. 2958-NFPA 70-2020 \[Section No. 300.50\]](#)

[Public Input No. 4170-NFPA 70-2020 \[Section No. 300.50\(A\) \[Excluding any Sub-Sections\]\]](#)

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Jones, Chad M.

first: another FR moved 300.50 to 305.15. we should mention that in the statement as a service to the reader.
second: the panel statement only mentions adding EMT to column 2 of the table. Changes were made in the paragraph before the table and the notes after the table that aren't described, explained or substantiated. I don't recall the panel making these changes. I'm not saying the changes are incorrect, I'm saying we've not documented and justified the changes.

Tellas, Ronald
agreed.

**First Revision No. 9351-NFPA 70-2021 [Section No. 300.50(F)]****(F) Raceway Seal.**

Where a raceway enters from an underground system, the end within the building shall be sealed with an identified compound ~~so as~~ to prevent the entrance of moisture ~~or gases~~, or it shall be so arranged to prevent moisture from contacting live parts .

Informational Note: Presence of hazardous gases or vapors might also necessitate sealing of underground conduits or raceways entering buildings.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Wed Jan 20 12:36:26 EST 2021

Committee Statement

Committee Statement: While the text in this section has existed in this exact form since at least 1990, the panel can see where different interpretations can exist. The text is rewritten to make it explicit and borrows the informational note from 300.5(G) without changing requirements.

Response Message: FR-9351-NFPA 70-2021

Public Input No. 878-NFPA 70-2020 [Section No. 300.50(F)]

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9459-NFPA 70-2021 [Section No. 590.4(B)]****(B) Feeders.**

Overcurrent protection shall be provided in accordance with 240.4, 240.5, 240.100, ~~and 240.101~~ 445.12, and 445.13. Conductors shall be permitted within cable assemblies or within multiconductor cords or cables of a type identified in Table 400.4 for hard usage or extra-hard usage. For the purpose of this section, the following wiring methods shall be permitted:

- (1) Type NM, Type NMC, and Type SE cables shall be permitted to be used in any dwelling, building, or structure without any height limitation or limitation by building construction type and without concealment within walls, floors, or ceilings.
- (2) Type SE cable shall be permitted to be installed in a raceway in an underground installation.

Exception: Single insulated conductors shall be permitted where installed for the purpose(s) specified in 590.3(C), ~~where and~~ accessible only to qualified persons.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Thu Jan 21 22:20:29 EST 2021

Committee Statement

Committee Statement: The appropriate rules in Article 445 for overcurrent protection of feeders supplied from a generator are referenced along with the rules from Article 240 to eliminate the possible requirement of adding redundant protection.

Response Message: FR-9459-NFPA 70-2021

Public Input No. 1927-NFPA 70-2020 [Section No. 590.4(B)]

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9460-NFPA 70-2021 [Section No. 590.4(F)]****(F) Lamp Protection.**

All lamps for general illumination shall be protected from accidental contact or breakage by a suitable luminaire or lampholder with a guard.

~~Brass shell, paper-lined sockets, or other metal-cased sockets~~ Metal guarded sockets shall not be used unless the ~~shell~~ metal guard is connected to the circuit equipment grounding conductor.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Thu Jan 21 22:25:32 EST 2021

Committee Statement

Committee Statement: While the existing language dates back to at least 1990, the panel can see the confusion caused by the change from 'grounded' to 'equipment grounding' for the 2020 cycle. The language has been revised to highlight that the metal guard for a lamp (if any) must be connected to the equipment grounding conductor.

Response Message: FR-9460-NFPA 70-2021

[Public Input No. 1093-NFPA 70-2020 \[Section No. 590.4\(F\)\]](#)

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9461-NFPA 70-2021 [Section No. 590.6(A)(3)]****(3) Receptacles on 15-kW or less Portable Generators.**

All 125-volt and 125/250-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are a part of a 15-kW or smaller portable generator shall have listed ground-fault circuit-interrupter protection for personnel. All 15- and 20-ampere, 125- and 250-volt receptacles, including those that are part of a portable generator, used in a damp or wet location shall comply with 406.9(A) and (B). Listed cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted for use with 15-kW or less portable generators manufactured or remanufactured prior to January 1, 2015.

Submitter Information Verification

Committee: NEC-P03

Submission Date: Thu Jan 21 22:54:54 EST 2021

Committee Statement

Committee Statement: This revision was made to update a referenced date to January 1st, 2015 to correlate with reference in 445.20(B) Exception to (A) and (B), as that is the most current date to reference.

GFCI protection is required for the receptacles referenced in this public input by the requirement of Section 590.6. There are generators that utilize a 125/250-volt 30A configured receptacle. This updated reference date in this revision simply recognizes older generators that are permitted to be used with devices that are listed as "portable GFCI".

Response Message: FR-9461-NFPA 70-2021

Public Input No. 152-NFPA 70-2019 [Section No. 590.6(A)(3)]

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9464-NFPA 70-2021 [Section No. 590.8(B)]****(B) Service Overcurrent Protective Devices.**

Overcurrent protective devices for solidly grounded wye electrical services of more than 150 volts to ground but not exceeding 1000 volts phase-to-phase, available fault current greater than 10,000 amperes, shall be current limiting.

Informational Note: The phrase “evidence of impending failure” means ~~that there is~~ evidence such as arcing, overheating, loose or bound equipment parts, visible damage, or deterioration exists. The phrase “properly maintained” means ~~that~~ the equipment has been maintained in accordance with the manufacturers’ recommendations and applicable industry codes and standards. References for manufacturers’ recommendations and applicable industry codes and standards include, but are not limited to, the following :

- (1) NEMA AB 4-2017, *Guidelines for Inspection and Preventative Maintenance of Molded-Case Circuit Breakers Used in Commercial and Industrial Applications*
- (2) NFPA 70B-2019, *Recommended Practice for Electrical Equipment Maintenance*
- (3) NEMA GD 1-2016, *Evaluating Water-Damaged Electrical Equipment*
- (4) IEEE 1458-2017, *IEEE Recommended Practice for the Selection, Field Testing, and Life Expectancy of Molded-Case Circuit Breakers for Industrial Applications*

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Thu Jan 21 23:29:46 EST 2021

Committee Statement

Committee Statement: For circuits where the available fault current is less than 10kA, conventional devices typically operate in a time frame that limits the amount of energy being released under fault conditions to a level that is manageable. While current limiting devices will open fault conditions in less amount of time, the reduction in energy being released during fault conditions has a diminished benefit to safety compared to current limiting devices applied where circuits have significantly more energy to release. A conventional molded-case circuit breaker with an instantaneous trip capability typically will trip in about 1.5 cycles under fault conditions whereas a current limiting fuse will typically open in half a cycle. For smaller amounts of fault current, like 10kA and less, reducing the clearing time by only a cycle has little effect on safety.

Response Message: FR-9464-NFPA 70-2021

Public Input No. 4247-NFPA 70-2020 [Section No. 590.8(B)]

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.



First Revision No. 9580-NFPA 70-2021 [Article 720]

Article 720 ~~Circuits and Equipment Operating at Less Than 50 Volts~~

720.1 ~~Scope.~~

~~This article covers installations operating at less than 50 volts, direct current or alternating current.~~

720.2 ~~Other Articles.~~

~~Direct current or alternating current installations operating at less than 50 volts, as covered in 411.1 through 411.8 ; Part VI of Article 517 ; Part II of Article 551 ; Parts II and III and 552.60(B) of Article 552 ; 650.1 through 650.9 ; 669.1 through 669.9 ; Parts I and VIII of Article 690 ; Parts I, II, and III of Article 725 ; or Parts I, II, and III of Article 760 , shall not be required to comply with this article.~~

720.3 ~~Hazardous (Classified) Locations.~~

~~Installations within the scope of this article and installed in hazardous (classified) locations shall also comply with the appropriate provisions for hazardous (classified) locations in other applicable articles of this Code .~~

720.4 ~~Conductors.~~

~~Conductors shall not be smaller than 12 AWG copper or equivalent. Conductors for appliance branch circuits supplying more than one appliance or appliance receptacle shall not be smaller than 10 AWG copper or equivalent.~~

720.5 ~~Lampholders.~~

~~Standard lampholders that have a rating of not less than 660 watts shall be used.~~

720.6 ~~Receptacle Rating.~~

~~Receptacles shall have a rating of not less than 15 amperes.~~

720.7 ~~Receptacles Required.~~

~~Receptacles of not less than 20-ampere rating shall be provided in kitchens, laundries, and other locations where portable appliances are likely to be used.~~

720.9 ~~Batteries.~~

~~Installations of storage batteries shall comply with 480.1 through 480.6 and 480.9 through 480.11 .~~

720.11 ~~Mechanical Execution of Work.~~

~~Circuits operating at less than 50 volts shall be installed in a neat and workmanlike manner. Cables shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use.~~

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Sun Jan 24 17:05:11 EST 2021

Committee Statement

Committee Statement: This article adds confusion to the Code and should be deleted. The current title suggests that this Article applies to all circuits and equipment operating at less than 50 volts; however, Section 720.2 has several places where this article shall not apply.

Article 720 first appeared in the 1920 edition of the NEC. It was written for stand-alone electrical power systems for farms. Generators were manufactured specifically for farms because the distribution of electrical power had not reached the rural areas of the country. These generators supplied electrical loads with a 32-volt DC system. Wiring methods were established in Article 720 to accommodate the loads supplied by these generators. This equipment has not been manufactured since the beginning of World War II. There are no known systems operating today.

Several manufacturers produced these generators and several hundred thousand were in operation during the 1920s and 1930s. The end of their existence came with the Rural Electrification Act of 1936. Although several manufacturers built the farm electrical plants, the most common was the Delco-Light Farm Electrical Plant. There is an abundance of very interesting information available about these power plants and they were very remarkable for their time.

Response FR-9580-NFPA 70-2021
Message:

[Public Input No. 2440-NFPA 70-2020 \[Article 720\]](#)

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9562-NFPA 70-2021 [Section No. 725.1]****725.1 Scope.**

This article covers ~~remote-control, signaling, and~~ power-limited circuits, including power-limited remote control and signaling circuits, that are not an integral part of a device or of utilization equipment.

Informational Note: The circuits described herein are characterized by usage and electrical power limitations that differentiate them from electric light and power circuits; therefore, alternative requirements to those of Chapters 1 through 4 are given with regard to minimum wire sizes, ampacity adjustment and correction factors, overcurrent protection, insulation requirements, and wiring methods and materials.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 22:01:17 EST 2021

Committee Statement

Committee Statement: Section 725.31 which covers Class 1 remote control and signaling circuits was deleted. Remote control and signaling circuits covered by 725 are now a subset of Class 2 and Class 3 circuits. The title of Section 725. has been modified to reflect this change. Additionally, language was modified for clarity .

Response Message: FR-9562-NFPA 70-2021

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9563-NFPA 70-2021 [Section No. 725.3(B)]**

(A) Spread of Fire or Products of Combustion.

Installation of ~~Class 1,~~ Class 2, and Class 3 circuits shall comply with 300.21.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 22:09:55 EST 2021

Committee Statement

Committee Statement: CMP3 has modified the text to comply with the NEC Style Manual.

725.3(A) has been moved to the new Class 1 Article 724 as 724.3(A) and is revised in the new article to add clarity and comply with the requirement in the NEC Style Manual to use complete sentences. If the new Article is rejected the change will be made to 725.3(A).

Response Message: FR-9563-NFPA 70-2021

[Public Input No. 1693-NFPA 70-2020 \[Section No. 725.3\(A\)\]](#)

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9621-NFPA 70-2021 [New Section after 725.3(D)]**

(E)_ Cables for Class 2 and Class 3 Circuits.

The listing and installation of cables for Class 2 and Class 3 circuits shall comply with Article 722, Parts I, II, and V.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Mon Feb 01 12:30:06 EST 2021

Committee Statement

Committee Statement: CMP3 has modified the text to comply with the NEC Style Manual.

725.3(E) has been moved to the new Class 1 Article 724 as 724.3(E) and is revised in the new article to add clarity and comply with the requirement in the NEC Style Manual to use complete sentences. If the new Article is rejected the change will be made to 725.3(E).

Response Message: FR-9621-NFPA 70-2021

Public Input No. 1694-NFPA 70-2020 [Section No. 725.3(E)]

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9427-NFPA 70-2021 [Section No. 725.24]**[Detail FR-9435](#)**725.24 Mechanical Execution of Work.**

~~Class 1, Class 2, and Class 3 circuits shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, hangers, cable ties, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4(D) .~~

[Detail FR-9438](#)**(A) General.**

Class 1, Class 2, and Class 3 circuits shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, hangers, cable ties listed and identified for securement and support, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with ~~300.4(D)~~ 300.4 and 300.11.

(B)

Circuit integrity (CI) cable shall be supported at a distance not exceeding 610 mm (24 in.). Cable shall be secured to the noncombustible surface of the building structure. Cable supports and fasteners shall be steel.

Informational Note: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants can result in an undetermined alteration of Class 1, Class 2, Class 3, and PLTC cable properties.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Thu Jan 21 16:58:29 EST 2021

Committee Statement

Committee Statement: The language is revised to address support requirements for Circuit Integrity cable to remain consistent with other uses throughout the NEC®, for correlation.

This first revision is a result of the Correlating Committee Task Group for Circuit Integrity Cable efforts to correlate information on Circuit Integrity (-CI) cable throughout the NEC®.

The change is being made in the new Article 722, Cables for Power Limited Circuits, in 722.24(C) since 725.24 is deleted in article 725 and moved to the new Article. If the new Article is rejected the change will be made to 725.24(B).

Response Message: FR-9427-NFPA 70-2021

[Public Input No. 2141-NFPA 70-2020 \[Section No. 725.24\]](#)

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9440-NFPA 70-2021 [Section No. 725.31]****725.31 Safety-Control Equipment.**

Where damage to remote-control power-limited circuits can result in a failure of safety-control equipment that would introduce a direct fire or life hazard, as covered in 725.31(A), all conductors of such remote-control circuits shall be installed in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, electrical metallic tubing, Type MI cable, or Type MC cable, or be otherwise suitably protected from physical damage the power-limited circuits shall be installed in accordance with 724.31. Room thermostats, water temperature regulating devices, and similar controls used in conjunction with electrically controlled household heating and air conditioning shall not be considered safety-control equipment.

(A) Remote-Control Circuits.

Remote-control circuits for safety-control equipment shall be classified as Class 1 if the failure of the equipment to operate introduces a direct fire or life hazard. Room thermostats, water temperature regulating devices, and similar controls used in conjunction with electrically controlled household heating and air conditioning shall not be considered safety-control equipment.

(A) Physical Protection.

Where damage to remote-control circuits of safety-control equipment would introduce a hazard, as covered in 725.31(A), all conductors of such remote-control circuits shall be installed in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, electrical metallic tubing, Type MI cable, or Type MC cable, or be otherwise suitably protected from physical damage.

Submitter Information Verification**Committee:** NEC-P03**Submittal Date:** Thu Jan 21 18:16:03 EST 2021**Committee Statement**

Committee Statement: It is not appropriate to reclassify Class 2 or Class 3 circuits as Class 1 circuits just to require the use of Class 1 circuit wiring methods. Reclassifying the circuits is confusing and would require the Class 2 or Class 3 source and load equipment to be recertified as Class 1 equipment. It is clearer to specify that Class 1 circuit wiring methods shall be used.

This first revision revises 725.31 to establish the conditions where special consideration is needed for circuits associated with safety-control equipment.

First revision TG2-18 establishes a new Article for Cables for Power-Limited Circuits, 722. 722.31 provides the circuit wiring methods for circuits associated with safety-control equipment.

Response Message: FR-9440-NFPA 70-2021

[Public Input No. 3351-NFPA 70-2020 \[Section No. 725.31\]](#)

Ballot Results

✓ This item has passed ballot

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Affirmative with Comment

Tellas, Ronald

agreed.

Zimmerman, George Allan

editorial - the text says "the power-limited circuits shall be installed in accordance with 724.31". The new article is 722.31, and the reference should be to 722.31 - the committee statement clearly says 722 and is correct - there is no 724.31.

**First Revision No. 9444-NFPA 70-2021 [Section No. 725.35]**

~~**725.35** Class 1, Class 2, and Class 3 Circuit Requirements.~~

~~A remote control, signaling, or power-limited circuit shall comply with the following parts of this article:~~

~~(0) Class 1 Circuits: Parts I and II~~

~~(0) Class 2 and Class 3 Circuits: Parts I and III~~

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Thu Jan 21 18:32:16 EST 2021

Committee Statement

Committee Statement: 725.35 is deleted. Class 1 circuits have been deleted from Article 725 and moved to a new Article. Remote control and signaling circuits covered by 725 are a subset of Class 2 and Class 3 circuits. This is covered by additional text and is added to the Scope 725.1 in first revision on Section 725.1 to make this clear and provide a reference for users of the Code.

Response Message: FR-9444-NFPA 70-2021

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9446-NFPA 70-2021 [Section No. 725.121(C)]**[Detail FR-9626](#)**(C) Marking.**

The equipment supplying the circuits shall be durably marked where plainly visible to indicate each circuit that is a Class 2 or Class 3 circuit. The power sources for limited power circuits in 725.60(A)(3), limited power circuits for listed audio/video equipment, listed information technology equipment, listed communications equipment, and listed industrial equipment in 725.60(A)(4) shall have a label indicating the maximum voltage and rated current output per conductor for each connection point on the power source. Where multiple connection points have the same rating, a single label shall be permitted to be used. ~~For equipment with a rated current per conductor less than 0.3 amperes, the effective date shall be January 1, 2021.~~

Informational Note No. 1: Rated current for power sources covered in 725.144 is the output current per conductor the power source is designed to deliver to an operational load at normal operating conditions, as declared by the manufacturer.

Informational Note No. 2: An example of a label is "52V @ 0.433A, 57V MAX" for an IEEE 802.3 compliant Class 8 power source.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Thu Jan 21 19:34:53 EST 2021

Committee Statement

Committee Statement: The text was added by the TIA and already appears in the NEC. The panel agrees to keep it as-is.

There is concern about how PoE systems will be inspected to comply with the NEC. A consistent label format will greatly ease the inspector burden, making it easy to confirm an install complies with Section 840.160 or Section 725.144 with a glance. This was overlooked by the CMP.

Response Message: FR-9446-NFPA 70-2021

[Public Input No. 553-NFPA 70-2020 \[Section No. 725.121\(C\)\]](#)

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9447-NFPA 70-2021 [Section No. 725.127]****725.127** Wiring Methods on Supply Side of the Class 2 or Class 3 Power Source.

Conductors and equipment on the supply side of the power source shall be installed in accordance with the appropriate requirements of Chapters 1 through 4. ~~Transformers or other devices supplied from electric light or power circuits shall be protected by an overcurrent device rated not over 20 amperes.~~

Exception: The input leads of a transformer or other power source supplying Class 2 and Class 3 circuits shall be permitted to be smaller than 14 AWG, but not smaller than 18 AWG if they are protected by an overcurrent device rated not over 20 amperes, are not over 305 mm (12 in.) long, and if they have insulation that complies with 725.24.49(B).

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Thu Jan 21 20:05:20 EST 2021

Committee Statement

Committee Statement: Power limited sources are no longer always supplied by a single transformer or power supply. Technologies such as PoE lighting require equipment with multiple Class 2 outputs that are supplied from a common equipment power source that can exceed the 20-ampere limit. For example, even a system with just forty-eight, 60-watt outputs would require almost 3KW. The 20-ampere is retained in the exception for the short lengths of lighter gauge wiring.

Response Message: FR-9447-NFPA 70-2021

Public Input No. 4475-NFPA 70-2020 [Section No. 725.127]

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.



First Revision No. 9449-NFPA 70-2021 [Section No. 725.130(A)]

(A) Class 1 Wiring Methods and Materials.

~~Installation shall be in accordance with 725.46~~ It shall be permitted to use Class 1 wiring methods for Class 2 and Class 3 circuits. Separation from electric light, power, Class 1, non-power-limited fire alarm circuit conductors, and medium-power network-powered broadband communications cables shall comply with 722.141 .

Exception: The ampacity adjustment factors given in 310.15(C)(1) shall not apply.

~~Exception No. 2: Class 2 and Class 3 circuits shall be permitted to be reclassified and installed as Class 1 circuits if the Class 2 and Class 3 markings required in 725.124 are eliminated and the entire circuit is installed using the wiring methods and materials in accordance with Part II, Class 1 circuits.~~

~~Informational Note: Class 2 and Class 3 circuits reclassified and installed as Class 1 circuits are no longer Class 2 or Class 3 circuits, regardless of the continued connection to a Class 2 or Class 3 power source.~~

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Thu Jan 21 20:29:12 EST 2021

Committee Statement

Committee Statement: It is not appropriate to reclassify Class 2 or Class 3 circuits as Class 1 circuits and to no longer consider them Class 2 or Class 3 circuits just to utilize Class 1 separation requirements. Although this might accommodate special circumstances where Class 2 or Class 3 circuits need to be installed together with the conductors of electric light, power, Class 1, non-power-limited fire alarm and medium power network-powered broadband communications circuits, the Class 2 or Class 3 source and load equipment would need to be recertified as Class 1 equipment. Eliminating required markings on the Class 2/3 source (e.g. "Class 2 Power Supply") and on the load equipment (e.g. "24V, 0.5A Class 2") would invalidate equipment certifications. A more valid approach is to establish the conditions under which the circuits can safely be installed. This revision removes the reclassification exception and adds permission to utilize Class 1 wiring methods. A separate Panel revision, TG2-40, establishes the requirements for separating conductors from power and lighting conductors. Class 1 wiring methods are required as before for the installed cables. These requirements provide more assurance of maintaining circuit separation than reclassifying Class 2 and Class 3 circuits as Class 1 circuits and retains the certification integrity of the connected equipment in the system.

TG2-19 deletes 725.130 as part of the relocation of cable requirements to a new Article 722 for Cables for Power Limited Circuits. These changes appear in the new Article in 722.140 and 722.141(H). If the new Article is rejected the changes will be made to 725.130(A) and new 725.136(H).

Response Message: FR-9449-NFPA 70-2021

Ballot Results

✓ This item has passed ballot

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Affirmative with Comment

Tellas, Ronald

agreed.

Zimmerman, George Allan

editorial - missing oxford comma (before "and") in list in second sentence, shown by <,> below : "Separation from electric light, power, Class 1, non-power-limited fire alarm circuit conductors <,> and medium-power network-powered broadband communications cables shall comply with 722.141 ."

**First Revision No. 9448-NFPA 70-2021 [Section No. 725.130(B)]**[Detail FR-9450](#)**(B) Class 2 and Class 3 Wiring Methods and Materials.**

Conductors on the load side of the power source shall be insulated ~~at not less than the requirements of 725.179 in accordance with 722.143~~ and shall be installed in accordance with ~~725.133 and 725.154 722.135~~.

Exception No. 1: As provided for in 620.21 for elevators and similar equipment.

Exception No. 2: Other wiring methods and materials installed in accordance with ~~the requirements of 725.3~~ shall be permitted to extend or replace the conductors and cables described in 725.179 and permitted by 725.130(B).

Exception No. 3: Bare Class 2 conductors shall be permitted as part of a listed intrusion protection system where installed in accordance with the listing instructions for the system.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Thu Jan 21 20:14:47 EST 2021

Committee Statement

Committee Statement: "Materials" is appropriate since insulation is included in the requirement. The panel adds "and Materials" to 725.130(B) for consistency.

The change is being made in the new Article 722, Cables for Power Limited Circuits, in Section 722.140(B) since Section 725.130 is deleted in Article 725 and moved to the new Article. If the new Article is rejected the change will be made to Section 725.130(B).

Response Message: FR-9448-NFPA 70-2021

[Public Input No. 433-NFPA 70-2020 \[Section No. 725.130\]](#)

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

18 Affirmative All

1 Affirmative with Comments

1 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Affirmative with Comment

Tellas, Ronald

agreed.

Negative with Comment

Zimmerman, George Allan

FR9448 is put in to modify the title of 725.130(B), as the panel statement says, in case the new article is rejected. However, the article text is changed by this FR to erroneously change the references to point to the text added by the new article 722 instead of to the original 725.133 and 725.135, which would be the case if the new article is rejected. As a result, there is no case in which the resulting article can be fully correct.

**First Revision No. 9451-NFPA 70-2021 [Section No. 725.133]**

~~**725.133** Installation of Conductors and Equipment in Cables, Compartments, Cable Trays, Enclosures, Manholes, Outlet Boxes, Device Boxes, Raceways, and Cable Routing Assemblies for Class 2 and Class 3 Circuits.~~

~~Conductors and equipment for Class 2 and Class 3 circuits shall be installed in accordance with 725.135 through 725.144 .~~

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Thu Jan 21 21:23:15 EST 2021

Committee Statement

Committee Statement: It is not clear if the change would affect the requirements. There is no technical substantiation given for the change.

The panel notes that this section was only used to indicate that the referenced requirements only applied to Class 2 and Class 3 circuits and not to Class 1 circuits. Since Class 1 circuits are no longer part of 725 or the new Article for Cables for Power Limited Circuits, 722, this section is no longer relevant and is removed from 725 and NOT moved to the new Article 722.

Response Message: FR-9451-NFPA 70-2021

Public Input No. 434-NFPA 70-2020 [Section No. 725.133]

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.

Affirmative with Comment

Tellas, Ronald
agreed.

Zimmerman, George Allan

editorial - The committee statement begins with what looks like a cut and paste error from a rejected Public Input. I believe "It is not clear if the change would affect the requirements. There is no technical substantiation given for the change." should be deleted from the committeestatement, or at least moved to the end of the statement so that it makes sense that we are making a change.

**First Revision No. 9458-NFPA 70-2021 [Section No. 725.144]****725.144** Transmission of Bundling of 4-Pair Cables Transmitting Power and Data.

Sections 725.144(A) and (B) shall apply to Class 2 and Class 3 circuits that transmit power and data to a powered device over listed 4-pair (8 conductor) cabling. Section 300.11 and Parts I and III of Article 725 shall apply to Class 2 and Class 3 circuits that transmit power and data. The conductors that carry power for the data circuits shall be copper. The current in the power circuit shall not exceed the current limitation of the connectors.

Informational Note No. 1: One example of the use of cables that transmit power and data is the connection of closed-circuit TV cameras (CCTV).

Informational Note No. 2: The 8P8C connector is in widespread use with powered communications systems. IEC 60603-7-2008, *Connectors for electronic equipment — Part 7-1: Detail specification for 8-way, unshielded, free and fixed connectors*, specifies these connectors to have a current-carrying capacity per contact of 1.0 amperes maximum at 60°C (149°F). See IEC 60603-7 for more information on current-carrying capacity at higher and lower temperatures.

Informational Note No. 3: The requirements of Table 725.144 were derived for carrying power and data over 4-pair copper balanced twisted pair cabling. This type of cabling is described in ANSI/TIA 568-C.2-2009, *Commercial Building Telecommunications Cabling Standard — Part 2: Balanced Twisted-Pair Telecommunications Cabling and Components*.

Informational Note No. 4: See TIA-TSB-184-A-2017, *Guidelines for Supporting Power Delivery Over Balanced Twisted-Pair Cabling*, for information on installation and management of balanced twisted pair cabling supporting power delivery.

Informational Note No. 5: See ANSI/NEMA C137.3-2017, *American National Standard for Lighting Systems — Minimum Requirements for Installation of Energy Efficient Power over Ethernet (PoE) Lighting Systems*, for information on installation of cables for PoE lighting systems.

Informational Note No. 6: Rated current for power sources covered in 725.144 is the output current per conductor the power source is designed to deliver to an operational load at normal operating conditions, as declared by the manufacturer. In the design of these systems, the actual current in a given conductor might vary from the rated current per conductor by as much as 20 percent. An increase in current in one conductor is offset by a corresponding decrease in current in one or more conductors of the same cable.

(A) Use of Class 2 or Class 3 Cables to Transmit Power and Data.

Where Types CL3P, CL2P, CL3R, CL2R, CL3, or CL2 transmit power and data, the rated current per conductor of the power source shall not exceed the ampacities in Table 725.144 at an ambient temperature of 30°C (86°F). For ambient temperatures above 30°C (86°F), the correction factors in Table 310.15(B)(1)(1) or in Equation 310.15(B) shall apply.

Exception: Compliance with Table 725.144 shall not be required for installations where conductors are 24 AWG or larger and the rated current per conductor of the power source does not exceed 0.3 amperes.

Informational Note: One example of the use of Class 2 cables is a network of closed-circuit TV cameras using 24 AWG, 60°C rated, Type CL2R, Category 5e balanced twisted-pair cabling.

[Detail FR-9543](#)

(B) Use of Class 2-LP or Class 3-LP Cables to Transmit Power and Data.

Types CL3P-LP, CL2P-LP, CL3R-LP, CL2R-LP, CL3-LP, or CL2-LP shall be permitted to supply power to equipment from a power source with a rated current per conductor up to the marked current limit located immediately following the suffix “-LP” and shall be permitted to transmit data to the equipment. Where the number of bundled LP cables is 192 or less and the selected ampacity of the cables in accordance with Table 725.144 exceeds the marked current limit of the cable, the ampacity determined from the table shall be permitted to be used. For ambient temperatures above 30°C (86°F), the correction factors of Table 310.15(B)(1)(1) or Equation 310.15(B) shall apply. The Class 2-LP and Class 3-LP cables shall comply with the following, as applicable:

- (1)

Cables with the suffix “-LP” shall be permitted to be installed in bundles, raceways, cable trays, communications raceways, and cable routing assemblies.
- (2)

Cables with the suffix “-LP” and a marked current limit shall follow the substitution hierarchy of Table 725.154 and Figure 725.154(A) 722.135(E) for the cable type without the suffix “-LP” and without the marked current limit.
- (3)

System design shall be permitted by qualified persons under engineering supervision.

Informational Note: An example of a limited power (LP) cable is a cable marked Type CL2-LP(0.5A), 23 AWG the marking on a 23 AWG, 4-pair, Class 2 cable rated 75°C with an LP current rating of 0.6 amperes per conductor is “CL2-LP(0.6A) 75°C AWG 4-pair”. See 722.179(A)(9).

Table 725.144 Ampacities of Each Conductor in Amperes in 4-Pair Class 2 or Class 3 Balanced Twisted-Pair Cables Based on Copper Conductors at an Ambient Temperature of 30°C (86°F) with All Conductors in All Cables Carrying Current, 60°C (140°F), 75°C (167°F), and 90°C (194°F) Rated Cables

-	Number of 4-Pair Cables in a Bundle																							
-	<u>1–7</u>				<u>8–19</u>				<u>20–37</u>				<u>38–61</u>				<u>62–91</u>				<u>92–192</u>			
-	<u>Temperature Rating</u>				<u>Temperature Rating</u>				<u>Temperature Rating</u>				<u>Temperature Rating</u>				<u>Temperature Rating</u>				<u>Temperature Rating</u>			
AWG	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C			
26	1.00	1.23	1.42	0.71	0.87	1.02	0.55	0.68	0.78	0.46	0.57	0.67	0.45	0.55	0.64	NA	NA	NA	NA	NA	NA			
24	1.19	1.46	1.69	0.81	1.01	1.17	0.63	0.78	0.91	0.55	0.67	0.78	0.46	0.56	0.65	0.40	0.48	0.55	0.40	0.48	0.55			
23	1.24	1.53	1.78	0.89	1.11	1.28	0.77	0.95	1.10	0.66	0.80	0.93	0.58	0.71	0.82	0.45	0.55	0.63	0.45	0.55	0.63			
22	1.50	1.86	2.16	1.04	1.28	1.49	0.77	0.95	1.11	0.66	0.82	0.96	0.62	0.77	0.89	0.53	0.63	0.72	0.53	0.63	0.72			

Notes:

Note 1:

For bundle sizes over 192 cables, or for conductor sizes smaller than 26 AWG, ampacities shall be permitted to be determined by qualified personnel under engineering supervision.

Note 2:

Where only half of the conductors in each cable are carrying current, the values in the table shall be permitted to be increased by a factor of 1.4.

Informational Note No. 1:

Elevated cable temperatures can reduce a cable's data transmission performance. For information on practices for 4-pair balanced twisted pair cabling, see TIA-TSB-184-A and 6.4.7, 6.6.3, and Annex G of ANSI/TIA-568-C.2, which provide guidance on adjustments for operating temperatures between 20°C and 60°C.

Informational Note No. 2:

The per-contact current rating of connectors can limit the maximum allowable current below the ampacity shown in Table 725.144.

Submitter Information Verification

Committee:

NEC-P03

Submittal Date:

Thu Jan 21 22:14:42 EST 2021

Committee Statement

Committee Statement:

The revised title more accurately reflects the content of the section. The section relates to the heating effects associated with the bundling of 4-pair cables and has nothing to do with data.

The proposed change also improves correlation, by aligning Section 725.144 with Section 840.160 as it was revised in the 2020 code, which recognizes that the table and its data considered 4-pair

cable only, and are only applicable to 4-pair cables.

Response FR-9458-NFPA 70-2021
Message:

[Public Input No. 1766-NFPA 70-2020 \[Section No. 725.144\]](#)

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

18 Affirmative All

0 Affirmative with Comments

2 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Negative with Comment

Ivans, Randolph J.

The revision is not accurate, as Section 725.144 is not limited to 4-pair cables. 725.144 states that Section 300.11 (securing and supporting of cables) and Parts I and III of Article 725 apply to circuits that carry power and data. These requirements are not limited to 4-pair cables. It is accurate to acknowledge that 725.144(A) and Table 725.144 only apply to 4-pair cables; however, this is clearly stated in the title of the Table. In contrast, 725.144(B) covers the use of "LP" rated cables for bundled cables transmitting power and data. The "LP" designation is

covered in UL 13, which is not limited to 4-pair cables. The scope of UL 13 states: "These requirements cover 60 – 250°C (140 – 482°F) single- and multiple-conductor power-limited circuit cables for use as fixed wiring within buildings (some are also marked for direct burial) principally for Class 3 and Class 2 circuits as described in Article 725 and other applicable parts of the National Electrical Code (NEC)." Section 44A of UL 13 covers the Cable Heating Test – For Cables Marked -LP (XX) and does not restrict the test or the marking to only 4-pair cables. Revising the parent language in 725.144 is not correct, and creates a conflict with 725.144(B). If additional clarity is needed then the title of 725.144 should be "Bundling of Cables Transmitting Power and Data" and the title of 725.144(A) should be "Use of 4-pair Class 2 or Class 3 Cables to Transmit Power and Data".

Tellas, Ronald

Review from CCCA suggests that the added text, "over listed 4-pair (8 conductor) cabling" is more confusing and could be easily interpreted that all cables must be -LP listed, which is not the intent of the table. It is suggested to not add this additional text.

**First Revision No. 9581-NFPA 70-2021 [Article 727]****Article 341** Instrumentation Tray Cable: Type ITC**341.1** Scope.

This article covers the use, installation, and construction specifications of instrumentation tray cable (Type ITC) for application to instrumentation and control circuits operating at 150 volts or less and 5 amperes or less.

341.3 Other Articles.

In addition to the provisions of this article, installation of Type ITC cable shall comply with other applicable articles of this *Code*.

341.4 Uses Permitted.

Type ITC cable shall be permitted to be used as follows in industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation:

- (1) In cable trays.
- (2) In raceways.
- (3) In hazardous locations as permitted in 501.10, 502.10, 503.10, 504.20, 504.30, 504.80, and 505.15.
- (4) Enclosed in a smooth metallic sheath, continuous corrugated metallic sheath, or interlocking tape armor applied over the nonmetallic sheath in accordance with 341.6. The cable shall be supported and secured at intervals not exceeding 1.8 m (6 ft).
- (5) Cable, without a metallic sheath or armor, that complies with the crush and impact requirements of Type MC cable and is identified for such use with the marking *ITC-ER* shall be permitted to be installed exposed. The cable shall be continuously supported and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be secured at intervals not exceeding 1.8 m (6 ft).

Exception to (5): Where not subject to physical damage, Type ITC-ER shall be permitted to transition between cable trays and between cable trays and utilization equipment or devices for a distance not to exceed 1.8 m (6 ft) without continuous support. The cable shall be mechanically supported where exiting the cable tray to ensure that the minimum bending radius is not exceeded.
- (6) As aerial cable on a messenger.
- (7) Direct buried where identified for the use.
- (8) Under raised floors in rooms containing industrial process control equipment and rack rooms where arranged to prevent damage to the cable.
- (9) Under raised floors in information technology equipment rooms in accordance with 645.5(E)(2).

341.5 Uses Not Permitted.

Type ITC cable shall not be installed on circuits operating at more than 150 volts or more than 5 amperes.

Installation of Type ITC cable with other cables shall be subject to the stated provisions requirements of the specific articles for the other cables. Where the governing articles do not contain stated provisions requirements for installation with Type ITC cable, the installation of Type ITC cable with the other cables shall not be permitted.

Type ITC cable shall not be installed with power, lighting, Class 1 circuits that are not power limited, or non-power-limited circuits.

Exception No. 1: Where terminated within equipment or junction boxes and separations are maintained by insulating barriers or other means.

Exception No. 2: Where a metallic sheath or armor is applied over the nonmetallic sheath of the Type ITC cable.

341.6 Construction.

The insulated conductors of Type ITC cable shall be in sizes 22 AWG through 12 AWG. The conductor material shall be copper or thermocouple alloy. Insulation on the conductors shall be rated for 300 volts. Shielding shall be permitted.

The cable shall be listed as being resistant to the spread of fire. The outer jacket shall be sunlight and moisture resistant.

Where a smooth metallic sheath, continuous corrugated metallic sheath, or interlocking tape armor is applied over the nonmetallic sheath, an overall nonmetallic jacket shall not be required.

Informational Note: One method of defining *resistant to the spread of fire* is that the cables do not spread fire to the top of the tray in the UL flame exposure, vertical tray flame test in ANSI/UL 1685-2010, *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables*. The smoke measurements in the test method are not applicable.

Another method of defining *resistant to the spread of fire* is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA vertical flame test — cables in cable trays, as described in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*.

341.7 Marking.

The cable shall be marked in accordance with 310.8(A)(2), ~~(A)(3)~~, ~~(A)(4)~~, and through (A)(5). Voltage ratings shall not be marked on the cable.

341.8 Ampacity.

The ampacity of the conductors shall be 5 amperes, except for 22 AWG conductors, which shall have an ampacity of 3 amperes.

341.9 Overcurrent Protection.

Overcurrent protection shall not exceed 5 amperes for 20 AWG and larger conductors, and 3 amperes for 22 AWG conductors.

341.10 Bends.

Bends in Type ITC cables shall be made so as not to damage the cable.

Submitter Information Verification

Committee: NEC-P03

Submission Date: Sun Jan 24 17:44:37 EST 2021

Committee Statement

Committee Statement: Article 727 deals with addresses a wiring method that is more appropriately covered in chapter 3.

ITC tray cable was originally accepted by CMP-6 for Chapter 3, Article 341, however, the correlating committee at the time chose to have it put in Chapter 7. The material should be moved, but changes needed to be made to meet the chapter 3 style manual requirements. The definition in 727.2 was deleted and will be relocated to Article 100.

Response Message: FR-9581-NFPA 70-2021

[Public Input No. 2756-NFPA 70-2020 \[Section No. 725.3\(G\)\]](#)

[Public Input No. 2696-NFPA 70-2020 \[Article 727\]](#)

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9477-NFPA 70-2021 [Section No. 728.4]****728.4 General.**

Fire-resistive cables, ~~fire-resistive and~~ conductors, and ~~their~~ components shall be tested and listed as a complete system, shall be designated for use in a specific ~~fire-rated~~ system, and shall not be interchangeable between systems.

Informational Note: One method of defining the fire rating is by testing the system in accordance with ANSI/ UL 2196-2017 , *Standard for Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables*.

~~Informational Note No. 2: Fire-resistive cable systems are considered part of an electrical circuit protective system.~~

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 10:33:45 EST 2021

Committee Statement

Committee Statement: The language is revised for clarity. The informational note was revised to reflect the proper title of the standard and title of the certification information.

Response Message: FR-9477-NFPA 70-2021

Public Input No. 2316-NFPA 70-2020 [Section No. 728.4]

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9481-NFPA 70-2021 [Section No. 728.5(B)]****(B) Supports.**

The fire-resistive cable system shall be supported in accordance with the listing and the manufacturer's installation instructions.

Informational Note: The supports are critical for survivability of the system. Each system has its specific support requirements.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 10:42:16 EST 2021

Committee Statement

Committee Statement: The section is revised as a fire-resistive cable is installed in a raceway, not a fire-resistive system.

Response Message: FR-9481-NFPA 70-2021

Public Input No. 2317-NFPA 70-2020 [Section No. 728.5(B)]

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.



First Revision No. 9482-NFPA 70-2021 [Sections 728.5(C), 728.5(D), 728.5(E), 728.5(F)]

(C) Raceways and Couplings.

Where ~~the~~ fire-resistive system cable is listed to be installed in a raceway, the raceways raceway enclosing the system cable, any couplings, and any connectors shall be listed as part of the fire-rated resistive cable system.

The raceway fill for each system shall comply with the listing requirements for the system and shall not be greater than the fill permitted in Chapter 9, Table 1, ~~Chapter 9~~.

Informational Note: Raceway fill may might not be the same for all listed fire-resistive cable systems.

(D) Cable Trays.

Cable trays used as part of a fire-resistive cable system shall be listed as part of the fire-resistive cable system.

(E) Boxes.

Boxes or enclosures used as part of a fire-resistive cable system shall be listed as part of the fire-resistive cable system and shall be secured to the building structure independently of the raceways or cables listed in the system.

(F) Pulling Lubricants.

Fire-resistive cable ~~systems~~ installed in a raceway shall only use pulling lubricants listed as part of the fire-resistive cable system.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 10:45:01 EST 2021

Committee Statement

Committee Statement: The section is revised as a fire-resistive cable is installed in a raceway, not a fire-resistive system.

The "fire rated system" is changed to fire-resistive system for consistency in this article.

Response Message: FR-9482-NFPA 70-2021

[Public Input No. 2319-NFPA 70-2020 \[Section No. 728.5\(C\)\]](#)

[Public Input No. 2321-NFPA 70-2020 \[Section No. 728.5\(E\)\]](#)

[Public Input No. 2322-NFPA 70-2020 \[Section No. 728.5\(F\)\]](#)

[Public Input No. 2320-NFPA 70-2020 \[Section No. 728.5\(D\)\]](#)

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9483-NFPA 70-2021 [Section No. 728.5(G)]****(G) Vertical Supports.**

Cables and conductors installed in vertical raceways shall be supported in accordance with the listing of the fire-resistive cable system and in accordance with 300.19 .

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 10:49:19 EST 2021

Committee Statement

Committee Statement: This reference to Section 300.19 is added for clarity and consistency with Section 760.3(I).

Response Message: FR-9483-NFPA 70-2021

Public Input No. 2323-NFPA 70-2020 [Section No. 728.5(G)]

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9486-NFPA 70-2021 [Section No. 728.60]****728.60** Equipment Grounding Conductor.

Fire-resistive ~~systems~~ cables installed in a raceway requiring an equipment grounding conductor shall use the same fire-rated resistive cable described in the system, unless alternative equipment grounding conductors are listed with the system. Any alternative equipment grounding conductors shall be marked with the system number. The system shall specify a permissible equipment grounding conductor. If not specified, the equipment grounding conductor shall be the same as the fire-rated resistive cable described in the system.

Submitter Information Verification**Committee:** NEC-P03**Submittal Date:** Fri Jan 22 11:20:07 EST 2021**Committee Statement**

Committee Statement: Fire-resistive system is revised to properly reflect fire-resistive cable system, as defined and the subject of this entire article, for consistency/correlation.

Response Message: FR-9486-NFPA 70-2021

Public Input No. 2324-NFPA 70-2020 [Section No. 728.60]

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9583-NFPA 70-2021 [Section No. 760.1]****760.1 Scope.**

This article covers the installation of wiring and equipment of fire alarm systems, including all circuits controlled and powered by the fire alarm system.

Informational Note No. 1: Fire alarm systems include fire detection and alarm notification, guard's tour, sprinkler waterflow, and sprinkler supervisory systems. Circuits controlled and powered by the fire alarm system include circuits for the control of building systems safety functions, elevator capture, elevator shutdown, door release, smoke doors and damper control, fire doors and damper control, and fan shutdown, but only where these circuits are powered by and controlled by the fire alarm system. For See NFPA 72 -2019, National Fire Alarm and Signaling Code, for further information on the installation and monitoring for integrity requirements for fire alarm systems, ~~refer to the NFPA 72 -2019, National Fire Alarm and Signaling Code~~.

Informational Note No. 2: Class 1, 2, and 3 circuits are defined in Articles 724 and 725.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Sun Jan 24 20:20:26 EST 2021

Committee Statement

Committee Statement: Panel adds a reference to the new Class 1 article in the renumbered IN #2

Response Message: FR-9583-NFPA 70-2021

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9509-NFPA 70-2021 [Section No. 760.3(A)]**

(A) Spread of Fire or Products of Combustion.

See Installation of fire alarm circuits shall comply with 300.21.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 13:27:51 EST 2021

Committee Statement

Committee Statement: This First Revision rewords the requirement into a complete sentence in compliance with the NEC Style Manual. In addition, the new language correlates with the new Articles 724 for Class 1 Circuits and 722 for Cables for Power-limited Circuits.

Response Message: FR-9509-NFPA 70-2021

Public Input No. 1698-NFPA 70-2020 [Section No. 760.3(A)]

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9511-NFPA 70-2021 [Section No. 760.3(D)]**

(D) Corrosive, Damp, or Wet Locations.

Sections Fire alarm circuits and equipment installed in corrosive, damp, or wet locations shall comply with 110.11, 300.5(B), 300.6, 300.9, and 310.10(F), where installed in corrosive, damp, or wet locations .

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 13:32:10 EST 2021

Committee Statement

Committee Statement: This First Revision rewords the requirement into a complete sentence in compliance with the NEC Style Manual.

Response Message: FR-9511-NFPA 70-2021

Public Input No. 1699-NFPA 70-2020 [Section No. 760.3(D)]

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9551-NFPA 70-2021 [Section No. 760.3(I)]**

(I) Vertical Support for FireRated -Resistive Cables and Conductors.

Vertical installations of circuit integrity (CI) cables and conductors installed in a raceway or conductors and cables of ~~electrical-circuit-protective~~ fire-resistive cable systems shall be installed in accordance with 300.19.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 17:42:53 EST 2021

Committee Statement

Committee Statement: The language was revised to be consistent throughout the NEC.

Response Message: FR-9551-NFPA 70-2021

Public Input No. 2174-NFPA 70-2020 [Section No. 760.3(I)]

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9519-NFPA 70-2021 [Section No. 760.3(J)]**

(J) ~~Number and Size~~ Installation of Cables and Conductors in Raceway.

~~Installations~~ The number and size of cables and conductors shall comply with 300.17.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 14:28:11 EST 2021

Committee Statement

Committee Statement: This First Revision rewords the requirement into a complete sentence in compliance with the NEC Style Manual. In addition, the title and text have been revised for clarity and to correlate with the new Articles 724 for Class 1 Circuits and 722 for Cables for Power-limited Circuits.

Response Message: FR-9519-NFPA 70-2021

Public Input No. 1702-NFPA 70-2020 [Section No. 760.3(J)]

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9523-NFPA 70-2021 [Section No. 760.24]****760.24 Mechanical Execution of Work.****(A) General.**

Fire alarm circuits shall be installed in a neat workmanlike manner. Cables and conductors installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by hardware, including straps, staples, hangers, cable ties, hangers, listed and identified for securement and support, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4 and 300.11.

Informational Note: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants might result in an undetermined alteration of PLFA and NPLFA cable properties.

(B) Circuit Integrity (CI) Cable.

Circuit integrity (CI) cables shall be supported at a distance not exceeding 610 mm (24 in.). Where located within 2.1 m (7 ft) of the floor, ~~as covered~~ in accordance with 760.53(A)(1) and 760.130(B)(1), as applicable, the cable shall be fastened in an approved manner at intervals of not more than 450 mm (18 in.). Cable supports and fasteners shall be steel.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 14:44:10 EST 2021

Committee Statement

Committee Statement: Listing is appropriate as the associated standards define critical performance ranges that can impact their suitability for use, including minimum and maximum operating temperature, resistance to ultraviolet light for outdoor installations, etc.. In addition, the panel added a reference to 300.11 as applicable to these installations and to correlate with the new Articles 724 for Class 1 Circuits and 722 for Cables for Power-limited Circuits.

Response Message: FR-9523-NFPA 70-2021

Public Input No. 3037-NFPA 70-2020 [Section No. 760.24]

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.
Bassett, Douglas P.
Burlison, Steven D.
Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Jones, Chad M.

editorial: missing an "AND" and a comma: "staples, hangers, cable ties listed and identified" should be: "staples, hangers, AND cable ties COMMA listed and identified"

Tellas, Ronald

agreed.

**First Revision No. 9524-NFPA 70-2021 [New Section after 760.32]****760.33** Supply-Side Overvoltage Protection.

A listed surge-protective device (SPD) shall be installed on the supply side of a fire alarm control panel in accordance with Part II of Article 242.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 14:51:03 EST 2021

Committee Statement

Committee Statement: Fire alarm control panels contain electronics that can be damaged by surges appearing on the supply side of the equipment. Providing overvoltage protection can increase the reliability of an installation. The panel added the new section after 760.32 as new 760.33. 760.32 covers NPLFA and PLFA circuits that leave the building, including overvoltage protection for these circuits. Having these requirements in sequence adds to the usability of the Code.

Response Message: FR-9524-NFPA 70-2021

Public Input No. 3036-NFPA 70-2020 [New Section after 760.35]

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9526-NFPA 70-2021 [Section No. 760.32]****760.32** Fire Alarm Circuits Extending Beyond One Building.

Non–power-limited fire alarm circuits and power-limited fire alarm circuits that extend beyond one building and run outdoors shall meet the installation requirements of Parts II, III, and IV of Article 805 and shall meet the installation requirements of Part I of Article 300.

~~Informational Note: An example of a protective device suitable to provide protection is a device tested to the requirements of ANSI/UL 497B, *Protectors for Data Communications*.~~

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 14:55:17 EST 2021

Committee Statement

Committee Statement: The panel deleted the informational note since only pointing to UL 497B can be misleading. Different types of protectors are needed for different installation scenarios. This is covered more comprehensively in Article 805.

Response Message: FR-9526-NFPA 70-2021

[Public Input No. 3317-NFPA 70-2020 \[Section No. 760.32\]](#)

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9529-NFPA 70-2021 [Section No. 760.121(B)]****(B) Branch Circuit.**

The branch circuit supplying the fire alarm equipment(s) shall comply with the following requirements: supply no other loads. The location of the branch-circuit overcurrent protective device shall be permanently identified at the fire alarm control unit. The circuit disconnecting means shall have red identification, shall be accessible only to qualified personnel, and shall be identified as "FIRE ALARM CIRCUIT." The red identification shall not damage the overcurrent protective devices or obscure the manufacturer's markings. This branch circuit shall not be supplied through ground-fault circuit interrupters or arc-fault circuit interrupters. The fire alarm branch-circuit disconnecting means shall be permitted to be secured in the "on" position.

- (1) The branch circuit shall supply no other loads.
- (2) The branch circuit shall not be supplied through ground-fault circuit interrupters or arc-fault circuit interrupters.
- (3) The location of the branch-circuit overcurrent protective device shall be permanently identified at the fire alarm control unit.
- (4) The circuit disconnecting means shall have red identification, shall be accessible only to qualified personnel, and shall be identified as with the following words: "FIRE ALARM CIRCUIT." The red identification shall not damage the overcurrent protective devices or obscure the manufacturer's markings.
- (5) The fire alarm branch-circuit disconnecting means shall be permitted to be secured in the "on" position.

Informational Note: See 210.8(A)(5). Exception, for requirements on receptacles in dwelling-unit unfinished basements that supply power for fire alarm systems.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 15:08:33 EST 2021

Committee Statement

Committee Statement: Putting existing requirements in a list adds clarity to the Code.

Other items in the list are already required in other parts of the code.

An informational note is added since this section has requirements for when an AFCI is not installed in a dwelling.

Response Message: FR-9529-NFPA 70-2021

Public Input No. 241-NFPA 70-2020 [Section No. 760.121(B)]

Public Input No. 319-NFPA 70-2020 [New Section after 760.121(B)]

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.



First Revision No. 9552-NFPA 70-2021 [Section No. 760.130(A)]

(A) NPLFA Wiring Methods and Materials.

The use of NPLFA wiring methods in accordance with 760.46, 760.49, or 760.53 for PLFA circuits shall be permitted. Installation shall be in accordance with 760.46, and conductors shall be solid or stranded copper. Separation from electric light, power, Class 1, non-power-limited fire alarm circuit conductors, and medium-power network-powered broadband communications cables shall comply with 760.136.

Exception: The ampacity adjustment factors given specified in 310.15(C)(1) shall not apply.

Exception No. 2: Conductors and multiconductor cables described in and installed in accordance with 760.49 and 760.53 shall be permitted.

Exception No. 3: Power-limited circuits shall be permitted to be reclassified and installed as non-power-limited circuits if the power-limited fire alarm circuit markings required by 760.124 are eliminated and the entire circuit is installed using the wiring methods and materials in accordance with Part II, Non-Power-Limited Fire Alarm Circuits.

Informational Note: Power-limited circuits reclassified and installed as non-power-limited circuits are no longer power-limited circuits, regardless of the continued connection to a power-limited source.

Submitter Information Verification

Committee: NEC-P03

Submission Date: Fri Jan 22 17:57:15 EST 2021

Committee Statement

Committee Statement: It is not appropriate to reclassify PLFA circuits as NPLFA circuits and to no longer consider them PLFA circuits just to utilize NPLFA separation requirements. Although this might accommodate special circumstances where PLFA circuits need to be installed together with the conductors of electric light, power, Class 1, non-power-limited fire alarm and medium power network-powered broadband communications circuits, the PLFA source and load equipment would need to be recertified as NPLFA equipment. Eliminating required markings on the PLFA source (e.g. "PLFA Power Source") and on the load equipment (e.g. "24V, 0.5A, PLFA 2") would invalidate equipment certifications. A more valid approach is to establish the conditions under which the circuits can safely be installed. This FIRST REVISION removes the reclassification exception and adds permission to utilize NPLFA wiring methods under specified conditions. A separate Panel FIRST REVISION, TG2-75, establishes the requirements for separating conductors from power and lighting conductors. NPLFA wiring methods are required as before with the addition of mechanical protection of the installed cables. These requirements provide more assurance of maintaining circuit separation than reclassifying PLFA circuits as NPLFA circuits and retains the certification integrity of the connected equipment in the system.

TG2-20 deletes 760.130 as part of the relocation of cable requirements to a new Article 722 for Cables for Power Limited Circuits. These changes appear in the new Article in 722.150 and 722.151(G). If the new Article is rejected the changes will be made to 760.130(A) and new 760.136(G).

Response Message: FR-9552-NFPA 70-2021

Ballot Results

✓ This item has passed ballot

22 Eligible Voters

2 Not Returned
18 Affirmative All
1 Affirmative with Comments
1 Negative with Comments
0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

Negative with Comment

Clary, Shane M.

This is a Directed Vote of the Automatic Fire Alarm Association, Codes and Standards. AFAA is not in agreement that Exception #2 should be removed. The existing rules require that a reclassified cable or cables be identified at all junction boxes and terminations. This is not only for safety, but to prevent these circuits which are part of a fire alarm system from being compromised.

**First Revision No. 9531-NFPA 70-2021 [Section No. 760.135(B)]****(B) Ducts Specifically Fabricated for Environmental Air.**

The following cables shall be permitted in ducts specifically fabricated for environmental air as described in 300.22(B), if they are directly associated with the air distribution system:

- (1) Types FPLP and Type FPLP-CI cables in lengths as short as practicable to perform the required function
- (2) Types FPLP, Type FPLP-CI, Type FPLR, Type FPLR-CI, Type FPL, and Type FPL-CI cables installed in raceways that are installed in compliance with 300.22(B)

Informational Note: ~~For information on fire protection of wiring installed in fabricated ducts, see 4.3.4.1 and 4.3.11.3.3 of NFPA 90A -2018, *Standard for the Installation of Air-Conditioning and Ventilating Systems*. See NFPA 90A-2021, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, 4.3.4.1 for information on fire protection of wiring installed in fabricated ducts.~~

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 15:16:29 EST 2021

Committee Statement

Committee Statement: This first revision references the latest edition for NFPA 90A.

Also, the reference to 4.3.11.3.3 does not belong in (B) and is removed. Section 4.3.11.3.3 covers plenums and Section 760.135(B) covers ducts specifically fabricated for environmental air.

Response Message: FR-9531-NFPA 70-2021

Public Input No. 680-NFPA 70-2020 [Section No. 760.135(B)]

Ballot Results

✔ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.
Burlison, Steven D.
Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9532-NFPA 70-2021 [Section No. 760.135(C)]****(C) Other Spaces Used For Environmental Air (Plenums).**

The following cables shall be permitted in other spaces used for environmental air as described in 300.22(C):

- (1) Type FPLP cables
- (2) Type FPLP cables installed in plenum communications raceways
- (3) Type FPLP cables installed in plenum routing assemblies
- (4) Types FPLP and Type FPLP-CI cables supported by open metallic cable trays or cable tray systems
- (5) Types FPLP, Type FPLR, and Type FPL cables installed in raceways that are installed in compliance with 300.22(C)
- (6) Types FPLP, Type FPLR, and Type FPL cables supported by solid bottom metal cable trays with solid metal covers in other spaces used for environmental air (plenums) as described in 300.22(C)
- (7) Types FPLP, Type FPLR, and Type FPL cables installed in plenum communications raceways, riser communications raceways, or general-purpose communications raceways supported by solid bottom metal cable trays with solid metal covers in other spaces used for environmental air (plenums) as described in 300.22(C)

Informational Note: See 4.3.11.3.3 of NFPA 90A-2021, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, for information on fire protection of wiring installed in other spaces used for environmental air (plenums).

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 15:23:25 EST 2021

Committee Statement

Committee Statement: An informational note is added for clarity and usability of the NEC. The specific section of NFPA 90A is included in accordance with the NEC Style Manual. Also, adding this informational note provides consistency with Section 760.135(B)

Response Message: FR-9532-NFPA 70-2021

Public Input No. 660-NFPA 70-2020 [Section No. 760.135(C)]

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9584-NFPA 70-2021 [Section No. 760.136(D)]****(D) Associated Systems Within Enclosures.**

Power-limited fire alarm conductors in compartments, enclosures, device boxes, outlet boxes, or similar fittings shall be permitted to be installed with electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits where they are introduced solely to connect the equipment connected to power-limited fire alarm circuits, and shall comply with either of the following conditions:

- (1) The electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuit conductors are routed to maintain a minimum of 6 mm ($\frac{1}{4}$ 0.25 in.) separation from the conductors and cables of power-limited fire alarm circuits.
- (2) The circuit conductors operate at 150 volts or less to ground and also comply with one of the following conditions :
 - a. The fire alarm power-limited circuits are installed using Type FPL, Type FPLR, Type FPLP, or permitted substitute cables; provided if these power-limited cable conductors extending beyond the jacket are separated by a minimum of 6 mm (0.25 $\frac{1}{4}$ in.) or by a nonconductive sleeve or nonconductive barrier from all other conductors.
 - b. The power-limited fire alarm circuit conductors are installed as non-power-limited circuits in accordance with 760.46.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Sun Jan 24 20:46:11 EST 2021

Committee Statement

Committee Statement: The changes make this section consistent with the code.

Response Message: FR-9584-NFPA 70-2021

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.

**First Revision No. 9534-NFPA 70-2021 [New Section after 760.136(F)]****(G) _ Where Protected.**

PLFA circuits shall be permitted to be installed together with the conductors of electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits where they are installed using NPFLA wiring methods and materials in accordance with Part II of Article 760 and are protected by an approved method.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 15:30:36 EST 2021

Committee Statement

Committee Statement: It is not appropriate to reclassify PLFA circuits as NPLFA circuits and to no longer consider them PLFA circuits just to utilize NPLFA separation requirements. Although this might accommodate special circumstances where PLFA circuits need to be installed together with the conductors of electric light, power, Class 1, non-power-limited fire alarm and medium power network-powered broadband communications circuits, the PLFA source and load equipment would need to be recertified as NPLFA equipment. Eliminating required markings on the PLFA source (e.g. "PLFA Power Source") and on the load equipment (e.g. "24V, 0.5A, PLFA 2") would invalidate equipment certifications. A more valid approach is to establish the conditions under which the circuits can safely be installed. This revision removes the reclassification exception and adds permission to utilize NPLFA wiring methods under specified conditions. A separate Panel first revision, TG2-74, establishes the requirements for using NPFLA circuit wiring methods. NPLFA 1 wiring methods are required as before. These requirements provide more assurance of maintaining circuit separation than reclassifying PLFA circuits as NPLFA circuits and retains the certification integrity of the connected equipment in the system.

TG2-20 deletes 760.136 as part of the relocation of cable requirements to a new Article 722 for Cables for Power Limited Circuits. These changes appear in the new Article in 722.150 and 722.151(G). If the new Article is rejected the changes will be made to 760.130(A) and new 760.136(G).

Response Message: FR-9534-NFPA 70-2021

Ballot Results

✔ This item has passed ballot

22 Eligible Voters
2 Not Returned
18 Affirmative All
1 Affirmative with Comments
1 Negative with Comments
0 Abstention

Not Returned

Christakos, Andrew C.
Sleights, John E.

Affirmative All

Anderson, Richard S.
Bassett, Douglas P.
Burlison, Steven D.
Burris, Jay
Casparro, Paul J.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

Negative with Comment

Clary, Shane M.

This is a Directed Vote of the Automatic Fire Alarm Association, Codes and Standards. AFAA is not in agreement with this proposed change to the Code. There have been problems when a NPLFA cable is used in this type of configuration. The existing rules require that a reclassified cable or cables be identified at all junction boxes and terminations. This is not only for safety, but to prevent these circuits which are part of a fire alarm system from being compromised.



First Revision No. 9535-NFPA 70-2021 [Section No. 760.139]

760.139 Installation of Conductors of Different PLFA Circuits, Class 2, Class 3, and Communications Circuits in the Same Cable, Enclosure, Cable Tray, Raceway, or Cable Routing Assembly.

(A) Two or More PLFA Circuits.

Cable and conductors of two or more power-limited fire alarm circuits, ~~communications circuits, or Class 3 circuits~~ shall be permitted within the same cable, enclosure, cable tray, raceway, or cable routing assembly.

(B) Class 2 Circuits with PLFA Circuits.

Conductors of one or more Class 2 circuits shall be permitted within the same cable, enclosure, cable tray, raceway, or cable routing assembly with conductors of power-limited fire alarm circuits, ~~provided that if~~ the insulation of the Class 2 circuit conductors in the cable, enclosure, raceway, or cable routing assembly is at least that required by the power-limited fire alarm circuits.

(C) Class 3 and Communications Circuits with PLFA Circuits.

Cable and conductors of Class 3 and communications circuits shall be permitted within the same cable, enclosure, cable tray, raceway, or cable routing assembly with cables and conductors of power-limited fire alarm circuits.

(D) Low-Power Network-Powered Broadband Communications Cables and PLFA Cables.

Low-power network-powered broadband communications circuits shall be permitted in the same enclosure, cable tray, raceway, or cable routing assembly with PLFA cables.

(E) Audio System Circuits and PLFA Circuits.

Audio system circuits described in 640.9(C) and installed using Class 2 or Class 3 wiring methods in compliance with 725.133 and 725.154 shall not be permitted to be installed in the same cable, cable tray, raceway, or cable routing assembly with power-limited conductors or cables.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 15:33:43 EST 2021

Committee Statement

Committee Statement: The title of (A), "Two or More PLFA Circuits", does not match the text which includes mixing PLFA circuits with Class 3 and Comm circuits in addition to two or more PLFA circuits. This First Revision moves Class 3 and Communications circuits under their own correct heading for clarity.

The First Revision is being made in the Article 722 for Cables for Power-limited Circuits. If the new article is not accepted the change will be made to 760.139.

Response Message: FR-9535-NFPA 70-2021

Public Input No. 3053-NFPA 70-2020 [Section No. 760.139]

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.



First Revision No. 9553-NFPA 70-2021 [Section No. 760.176(F)]

(F) Fire Alarm Circuit Integrity (CI) Cable, Fire-Resistive Cable System, or Electrical Circuit Protective System.

Cables that are used for survivability of critical circuits under fire conditions shall be listed and meet either the requirements of 760.176(F)(1), or (F)(2), or (F)(3).

Informational Note: Fire See 12.4.3 and 12.4.4 of NFPA 72-2019, National Fire Alarm and Signaling Code, for fire alarm circuit integrity (CI) cable, fire-resistive cable systems, or and electrical circuit protective systems may that might be used for fire alarm circuits to comply with the survivability requirements of NFPA 72-2019, National Fire Alarm and Signaling Code, 12.4.3 and 12.4.4, that the circuit to maintain its the circuit's electrical function during fire conditions for a defined period of time.

Informational Note No. 2: One method of defining circuit integrity (CI) cable or an electrical circuit protective system is by establishing a minimum 2-hour fire-resistive rating for the cable when tested in accordance with ANSI/UL 2196-2017, Standard for Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control, and Data Cables.

Informational Note No. 3: UL guide information for electrical circuit protective systems (FHIT) contains information on proper installation requirements for maintaining the fire rating.

(1) Circuit Integrity (CI) Cables.

Circuit integrity (CI) cables, specified in 760.176(C), (D), and (E), and used for survivability of critical circuits, shall have be marked for an additional classification using the suffix "- CI." In order to maintain its listed fire-resistive rating, CI cables shall only be installed in free air in accordance with 760.24(B). CI cables shall only be permitted to be installed in a raceway where specifically listed and marked as part of an electrical circuit protective fire-resistive cable system as covered in 760.176(F)(2). Circuit integrity (CI) cables shall only be permitted to be installed in a raceway where specifically listed and marked as part of an electrical circuit protective system as covered in 760.176(F)(2).

Informational Note: One method of defining CI cable is by establishing a rating when tested in accordance with UL 2196, Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables, as specified in UL 1425, Cables for Non-Power-Limited Fire-Alarm Circuits. UL guide information for non-power-limited fire alarm circuits (HNHT) contains information for identifying the cable and its installation limitations to maintain the fire-resistive rating.

(2) Electrical Circuit Protective Fire-Resistive Cable Systems.

Cables specified in 760.176(C), (D), (E), and (F)(1), that are part of an electrical circuit protective system, shall be identified with the protective system number and hourly rating printed on the outer jacket of the cable and installed in accordance with the listing of the protective system a fire-resistive cable system shall be identified with the system identifier and hourly rating marked on the protectant or the smallest unit container and installed in accordance with the listing of the system.

Informational Note: One method of defining a fire-resistive cable system is by establishing a rating when tested in accordance with UL 2196, Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables. UL guide information for electrical circuit integrity systems (FHIT) contains information for identifying the system and its installation limitations to maintain a minimum fire-resistive rating.

(3) Electrical Circuit Protective System.

Protectants for cables specified in 760.176(C), (D), and (E) that are part of an electrical circuit protective system shall be identified with the protective system identifier and hourly rating marked on the protectant or the smallest unit container and installed in accordance with the listing of the protective system.

Informational Note: One method of defining an electrical circuit protective system is by establishing a rating when tested in accordance with UL 1724, Fire Tests for Electrical Circuit Protective Systems. UL guide information for electrical circuit integrity systems (FHIT) contains information for identifying the system and its installation limitations to maintain the fire-resistive rating.

Supplemental Information

<u>File Name</u>	<u>Description</u> <u>Approved</u>
NEC_760.176_F_FR9553.docx	For staff use

Submitter Information Verification

Committee: NEC-P03

Submission Date: Fri Jan 22 18:03:19 EST 2021

Committee Statement

Committee Statement: The language was revised to be consistent throughout the NEC.

Response Message: FR-9553-NFPA 70-2021

[Public Input No. 2175-NFPA 70-2020 \[Section No. 760.176\(F\)\]](#)

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Horner, Raymond W.

NEMA supports the addition of Fire-Resistive Cable System but there was not substantiation to keep Electrical Circuit Protective System. When 2-hour fire resistive cables were first introduced into the NEC, UL called these systems "Electrical Circuit Protective System" and they were tested to UL 2196. In 2012, UL withdraw all listed cables under this classification and renamed the new listing cables as a Fire-Resistive Cable System. Electrical Circuit Protective System should be removed from this section of the NEC.

Tellas, Ronald

agreed.



First Revision No. 9536-NFPA 70-2021 [Section No. 760.176 [Excluding any Sub-Sections]]

Non-power-limited fire alarm cables installed as wiring within buildings shall be listed in accordance with 760.176(A) and (B) and as being resistant to the spread of fire in accordance with 760.176(C) through (F), and shall be marked in accordance with 760.176(G). Cable used in a wet location shall be listed for use in wet locations or have a moisture-impervious metal sheath. Non-power-limited fire alarm cables shall have a temperature rating of not less than 60°C (140°F). Non-power-limited fire alarm cables shall be permitted to contain optical fibers.

Informational Note: See UL 1425, *Standard for Cables for Non-Power-Limited Fire-Alarm Circuits*, for information on non-power-limited fire alarm cables.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 15:37:29 EST 2021

Committee Statement

Committee Statement: NPLFA cables are permitted to contain optical fibers and are marked with the suffix “-OF.” This is permitted in the UL standard for non-power limited fire alarm cables, UL 1425. In addition, 770.3(C) requires composite optical fiber cables to be classified as electrical cables based on type of electrical conductors.

760.176 is revised to permit optical fibers. A note is added to Table 760.176(G) to include the “-OF” suffix for cables containing optical fiber members.

Response Message: FR-9536-NFPA 70-2021

Public Input No. 315-NFPA 70-2020 [Section No. 760.176]

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.



First Revision No. 9585-NFPA 70-2021 [Section No. 760.179(G)]

(G) Fire Alarm Circuit Integrity (CI) Cable, Fire-Resistive Cable System, or Electrical Circuit Protective System.

Cables that are used for survivability of critical circuits under fire conditions shall be listed and meet either the requirements of 760.179(G)(1), (G)(2), or (G)(2 3).

Informational Note: Fire See 12.4.3 and 12.4.4 of NFPA 72 -2019, National Fire Alarm and Signaling Code , for fire alarm circuit integrity (CI) cable, fire-resistive cable systems, and or electrical circuit protective systems ~~may that might~~ be used for fire alarm circuits to comply with the survivability requirements of ~~NFPA 72 -2019, National Fire Alarm and Signaling Code~~ , 12.4.3 and 12.4.4, that the circuit to maintain its the circuit's electrical function during fire conditions for a defined period of time.

Informational Note No. 2: ~~One method of defining circuit integrity (CI) cable or an electrical circuit protective system is by establishing a minimum 2-hour fire-resistive rating for the cable when tested in accordance with ANSI/UL 2196-2017, Standard for Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables .~~

Informational Note No. 3: ~~UL guide information for electrical circuit protective systems (EHIT) contains information on proper installation requirements for maintaining the fire rating.~~

(1) Circuit Integrity (CI) Cables.

Circuit integrity (CI) cables specified in 760.179(D), (E), (F), and (H), and used for survivability of critical circuits, shall have an additional classification using the suffix “- CI.” ~~Circuit integrity (CI) cables shall only be permitted to be installed in a raceway where specifically listed and marked as part of an electrical circuit protective~~ a fire-resistive system as covered in 760.179(G)(2).

(2) Electrical Circuit Protective System.

Cables specified in 760.179(D), (E), (F), (H), and (G)(1), that are part of an electrical circuit protective system, shall be identified with the protective system number and hourly rating printed on the outer jacket of the cable and installed in accordance with the listing of the protective system.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Sun Jan 24 20:55:15 EST 2021

Committee Statement

Committee Statement: The language was revised to be consistent throughout the NEC.

Response Message: FR-9585-NFPA 70-2021

Public Input No. 2180-NFPA 70-2020 [Section No. 760.179(G)]

Ballot Results

✓ **This item has passed ballot**

22 Eligible Voters

2 Not Returned

18 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Horner, Raymond W.

: NEMA supports the addition of Fire-Resistive Cable System but there was not substantiation to keep Electrical Circuit Protective System. When 2-hour fire resistive cables were first introduced into the NEC, UL called these systems "Electrical Circuit Protective System" and they were tested to UL 2196. In 2012, UL withdraw all listed cables under this classification and renamed the new listing cables as a Fire-Resistive Cable System. Electrical Circuit Protective System should be removed from this section of the NEC.

Tellas, Ronald

agreed.

**First Revision No. 9540-NFPA 70-2021 [New Section after 760.179(H)]****(I)_ Cables Containing Optical Fibers.**

Composite optical fiber cables shall be listed as electrical cables based on the type of electrical conductors.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 15:51:40 EST 2021

Committee Statement

Committee Statement: This first revision is Included in the new cable article 7ZZ as 7ZZ.179(A)(13) and a note to Table 7ZZ.179(B)(1) Cable Type Markings. See See public input 3671 and TG2-18.

No change is needed to 760.179 if PLFA cable is moved to new article. Continuous Line-Type Fire Detectors do not use an "-OF" suffix. If the proposed new cable article is rejected the panel will issue a first revision to make this change in Section 760.179.

Response Message: FR-9540-NFPA 70-2021

Public Input No. 299-NFPA 70-2020 [Section No. 760.179]

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.

**First Revision No. 9542-NFPA 70-2021 [Section No. 760.179(I)]****(J) Cable Marking.**

The cable shall be marked in accordance with ~~Table 760.179(I)~~ Table 760.179(J). The voltage rating shall not be marked on the cable. Cables that are listed for circuit integrity shall be identified with the suffix "-CI" as defined in 760.179(G). The temperature rating shall be marked on the jacket of PLFA cables that have a temperature rating exceeding 60°C (140°F). The jacket of PLFA cables shall be marked with the conductor size.

Informational Note No. 1: Voltage ratings on cables ~~may~~ might be misinterpreted to suggest that the cables ~~may~~ might be suitable for Class 1, electric light, and power applications.

Exception: Voltage markings shall be permitted where the cable has multiple listings and voltage marking is required for one or more of the listings.

Table 760.179(J) Cable Markings

<u>Cable Marking</u>	<u>Type</u>
FPLP	Power-limited fire alarm plenum cable
FPLR	Power-limited fire alarm riser cable
FPL	Power-limited fire alarm cable

Notes:

Note 1 : Cables identified in 760.179(D), (E), and (F) as meeting the requirements for circuit integrity shall have the additional classification using the suffix "-CI" (for example, FPLP-CI, FPLR-CI, and FPL-CI).

2. Cables containing optical fibers shall be provided with the suffix "-OF".

Informational Note No. 2: Cable types are listed in descending order of fire performance.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 16:01:43 EST 2021

Committee Statement

Committee Statement: NPLFA cables are permitted to contain optical fibers and are marked with the suffix "-OF." This is permitted in the UL standard for non-power limited fire alarm cables, UL 1425. In addition, 770.3(C) requires composite optical fiber cables to be classified as electrical cables based on type of electrical conductors.

760.176 is revised to permit optical fibers. A note is added to Table 760.176(G) to include the "-OF" suffix for cables containing optical fiber members.

Response Message: FR-9542-NFPA 70-2021

Ballot Results

✔ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay

Casparro, Paul J.

Clary, Shane M.

Cogbill, Michael

Horner, Raymond W.

Ivans, Randolph J.

Iverson, Donald R.

Jones, Chad M.

Jones, Robert A.

Krueger, Kyle

Mikloiche, Timothy J.

Owen, Steven J.

Pace, David A.

Rokowski, Samuel

Szeto, William C.

Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald

agreed.



First Revision No. 9541-NFPA 70-2021 [Section No. 760.179 [Excluding any Sub-Sections]]

PLFA cables installed as wiring within buildings shall be listed as being resistant to the spread of fire and other criteria in accordance with 760.179(A) through (H) and shall be marked in accordance with 760.179(I) 760.179(J) . Insulated continuous line-type fire detectors shall be listed in accordance with 760.179(J) 760.179(K) . Cable used in a wet location shall be listed for use in wet locations or have a moisture-imperious metal sheath.

Informational Note: See UL 1424, *Cables for Power-Limited Fire-Alarm Circuits* , for applicable requirements for listing of power-limited fire alarm cable.

Submitter Information Verification

Committee: NEC-P03

Submittal Date: Fri Jan 22 15:59:31 EST 2021

Committee Statement

Committee Statement: This first revision is included in the new cable article 722 as an informational note to 722.179(A). See public input 3671 and TG2-18.

If the proposed new cable article is rejected the panel will issue a first revision to make this correction in 760.179.

The informational note referring to the listing standard was added to improve understanding and usability of the code.

Response Message: FR-9541-NFPA 70-2021

Public Input No. 344-NFPA 70-2020 [Section No. 760.179 [Excluding any Sub-Sections]]

Ballot Results

✓ This item has passed ballot

22 Eligible Voters

2 Not Returned

19 Affirmative All

1 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Christakos, Andrew C.

Sleights, John E.

Affirmative All

Anderson, Richard S.

Bassett, Douglas P.

Burlison, Steven D.

Burris, Jay
Casparro, Paul J.
Clary, Shane M.
Cogbill, Michael
Horner, Raymond W.
Ivans, Randolph J.
Iverson, Donald R.
Jones, Chad M.
Jones, Robert A.
Krueger, Kyle
Mikloiche, Timothy J.
Owen, Steven J.
Pace, David A.
Rokowski, Samuel
Szeto, William C.
Zimmerman, George Allan

Affirmative with Comment

Tellas, Ronald
agreed.