2023 *National Electrical Code*®

Revisions to Cable Requirements

Class 1, 2, 3 & 4, communications, fire alarm and optical fiber cables

By Stanley Kaufman, PhD; CableSafe, Inc.

Consultant to the Communications Cable and Connectivity Association (CCCA)

&

Ronald Tellas; Technology and Application Manager, Belden

Principal, NFPA 70 CMP3, CCCA

The *National Electrical Code*® (*NEC*®) is published by the National Fire Protection Association with revisions on a three-year schedule. The 2023 *NEC,* which replaces the 2020 *NEC,* will be issued by NFPA in August 2022.

This article, sponsored by the Communications Cable and Connectivity Association (CCCA), is intended to provide the reader with a guide to the key changes in the 2023 National Electrical Code that are of interest to manufacturers, installers, distributors and users of Class 1, 2, 3 & 4, communications, fire alarm and optical fiber cables.

Continued Development of Article 800, General Requirements for Communications Systems

Chapter 8 in the National Electrical Code covers Communications Systems. Prior to the 2020 edition, Chapter 8 had five Articles. The 2020 edition of the NEC introduced a new Article into Chapter 8, Article 800, *General Requirements for Communications Systems* and renumbered the previous Article 800, *Communications Circuits* as Article 805. The primary purpose of the new article was to consolidate redundant requirements by placing them into one general article. In the 2020 NEC, identical requirements in Articles 800 (renumbered to 805), 820, 830 & 840 in the 2017 NEC were deleted from these Articles and placed in the new general article (Article 800)

NEC Chapter 8 Articles	
2017 NEC	**2020 & 2023 NEC**
	Article 800, *General Requirements for Communications Systems*
Article 800, *Communications Circuits*	Article 805, *Communications Circuits*
Article 810, *Radio and Television Equipment*	Article 810, *Radio and Television Equipment*
Article 820, *Community Antenna Television and Radio Distribution Systems*	Article 820, *Community Antenna Television and Radio Distribution Systems*
Article 830, *Network-Powered Broadband Communications Systems*	Article 830, *Network-Powered Broadband Communications Systems*
Article 840, *Premises-Powered Broadband Communications Systems*	Article 840, *Premises-Powered Broadband Communications Systems*

The development of the general article continued in the 2023 NEC by moving requirements which had similar intent, but not identical code language, into Article 800. For example, the requirements for installing communications cables, CATV cables and network-powered broadband cables entering buildings, along with the rules for installing unlisted outside plant communications and CATV entrance cables, will be in Article 800 in the 2023 NEC.

Listing requirements for all Plenum Cables (CMP, CATVP & BLP), Riser Cables (CMR, CATVR & BLR), General-Purpose Cable (CMG, CM, CATV, BM & BL), Limited-Use Cables (CMX, CATVX & BLX), Undercarpet Wires and Cables (CMUC), and Communications Wires will be in Article 800. Article 800 will also include listing requirements for communications circuit integrity (CI) cables, as well as communications cables used in Fire-Resistive Cable systems and Electrical Circuit Protective Systems.

Limited-Power (LP) Communications Cables (CMP-LP, CMR-LP, CMG-LP & CM-LP), will also have their listing requirements in Article 800. Communications Limited-Power cables are used primarily as approved substitutes for Class 2 & Class 3 Limited –Power Cables in accordance with section 725.144.

Snuggle Up and Separation Rules for Cables

In order to understand the similarities and differences between Class 1, 2 & 3, communications, fire alarm and optical fiber cables, it is useful to look at the separation rules for these cables in the 2020 NEC. Some of the cables are required to be separated from the others. Others are permitted to be installed in the same raceway, cable tray or cable routing assembly, or in non-code language, they are permitted to snuggle up to each other.

The ones that are permitted to snuggle up are low hazard cables; power-limited Class 2, Class 3 and fire alarm cables; communications cables, CATV cables, and low-power network-powered broadband communications cables; and no-voltage cables (optical fiber cables).

These low-hazard cables are required to be separated from electric light, power, Class 1, non-power-limited fire alarm, and medium-powered network-powered broadband cables.

Deletion of Article 720

Article 720, *Circuits and Equipment Operating at Less Than 50 Volts***,** 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.

This Article will be deleted to avoid confusion with any present-day systems.

Improving the Usability of Article 725

Article 725, *Class 1, Class 2, and Class 3 Remote-Control, Signaling, and Power-Limited Circuits*, covers both power-limited and non-power-limited circuits and cabling. In order to improve the usability of Article 725, each type of circuit or system was placed in its own Article and the cabling to support these circuits and systems also was placed into a single Article. Article 725 will be dedicated to power-limited circuits with new title, *Class 2 and Class 3 Power-Limited Circuits.*

New Article 724

Since Class 1 circuits are physically separated from the low hazard circuits in installation, perhaps they shouldn't be in the same code Article. Panel 3 decided to improve the usability or Article 725 by removing Class 1 circuits and putting them a new Article, Article 724, *Class 1 Power-Limited Circuits and Class 1 Power-Limited Remote-Control and Signaling Circuits*.

The listing requirements for Class 2 and Class 3 cables have been moved to new Article 722 which consolidates the listing requirements for power-limited cables, and also includes the new Class 4 Fault Managed Power Systems (FMPS) cables in one Article.

Fault-Managed Power Systems

New Article 726, *Class 4 (CL4) Power Systems*, introduces a new type of circuit into the NEC. What is a fault-managed power system and how does it differ from power-limited circuits? Per the scope of UL 1400-1, *Outline for Fault-Managed Power Distribution Technologies — Part 1: General Requirements,* these systems are characterized by sophisticated monitoring and control systems that monitor the circuit for faults and control the power transmitted to ensure that the energy delivered into a fault is limited. Class 4 power systems differ from Class 2, and 3 systems in that they are not limited at the source but are power-limited with respect to risk of electric shock and fire between the Class 4 Transmitter and Class 4 Receiver.

New Article for Cables

The scope of new Article 722, *Cables for Power-Limited Circuits, Fault-Managed Power Circuits, and Optical Fiber* is:

"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, Class 4 fault-managed power circuits, and optical fiber installations."

Article 722 has an Informational Note referring to the listing requirements for Class 4 cables:

"Informational Note: See UL 1400-1, *Outline for Fault-Managed Power Distribution Technologies — Part 1: General Requirements*, for information on determining applicable requirements for the listing of Class 4 power systems. Excessive cable lengths can result in higher capacitance which could affect the safety of the circuit."

Inclusion of optical fiber cables in Article 722 is controversial. Panel 16, which is responsible for Article 770, *Optical Fiber Cables*, opposed moving the listing requirements for these cables from Article 770 to Article 722. The Correlating Committee overrode the Panel 16 action and agreed with Panel 3 that the requirements should be moved.

Article 727 is now new Article 335

Article 727 deals with a wiring method that is more appropriately covered in chapter 3. All information in Article 727, *Instrumentation Tray Cable: Type ITC* was updated and moved to new Article 335, *Instrumentation Tray Cable: Type ITC.* Article 727 will be deleted.

Next Step in the Development of the 2023 NEC

The next step in the development of the NEC is the Technical Meeting on June 8th where Certified Amending Motions (CAMs) will be heard and voted upon. CAMs seeking to keep the requirements for Optical Fiber Cables will be acted on.

The 2023 National Electrical Code is available for sale from the National Fire Protection Association at http://www.nfpa.org/ .

UPDATED: Post June 8, 2022, Technical Meeting

The original article above, which was published in Cabling Installation & Maintenance (CI&M) before the National Fire Protection Association Technical Meeting on June 8, 2022, indicated that some of the changes were tentative because the association was set to hear challenges to the changes.

The CI&M article reported that a new Article, *Article 722, Cables for Power-Limited Circuits, Fault-Managed Power Circuits, and Optical Fiber* would be included in the new Code, but that Inclusion of optical fiber cables in Article 722 was controversial. Panel 16, which is responsible for Article 770, Optical Fiber Cables, opposed moving the listing requirements for these cables from Article 770 to Article 722. The Correlating Committee overrode the Panel 16 action and agreed with Panel 3 that the requirements should be moved.

The issue was resolved by the actions at the NFPA Technical Meeting, followed by actions of NEC Panels 3 & 16, and the NFPA Standards Council which permitted the optical fiber cable requirements to remain in *Article 770, Optical Fiber Cables*, and remove optical fiber cable from the title and scope of Article 722.

ARTICLE 722 is now titled, “Cables for Power-Limited Circuits and Fault-Managed Power Circuits”. The 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 Class 4 fault-managed power circuits.

STANLEY KAUFMAN, Ph.D. is principal of CableSafe Inc. and a consultant to the Communications Cable and Connectivity Association (CCCA; www.cccassoc.org). He is a member of NEC Code-Making Panels 12 and 16. He is also a member of the NFPA Technical Committee on Electronic Computer Systems which is responsible for NFPA 75, *Standard for the Fire Protection of Information Technology Equipment* and the NFPA Technical Committee on Telecommunications which is responsible for NFPA 76, *Standard for the Fire Protection of Telecommunications Facilities*.

RONALD TELLAS is a subject-matter expert in RF design and Electromagnetic Propagation and joined Belden in 2016 to help define the roadmap of technology and applications in the Smart Building. He represents Belden in the ISO WG3 committee, TIA TR42 Premises Cabling Standards and IEEE 802.3 Ethernet Working Group and is a committee member of NFPA 70 Code-Making Panel 3. Ron is the inventor of 16 US patents. He has a Bachelor of Science degree in Electrical Engineering from Purdue University, a Master of Science degree in Electrical Engineering from Illinois Institute of Technology, and a Master of Business Administration from Purdue University. Ron is a member of the CCCA Codes & Standards Committee.