



NATIONAL FIRE PROTECTION ASSOCIATION

The leading information and knowledge resource on fire, electrical and related hazards

**NATIONAL ELECTRICAL CODE®
CODE-MAKING PANEL 3
NFPA 70
Second Draft Meeting Agenda
October 29 – November 3, 2018
San Diego, CA**

1. Call to Order – Robert Jones, Chair
2. Introductions
3. Approval of Previous Meeting Minutes (Attachment A)
4. Staff Updates - NFPA Staff
 - Overview of NFPA Process
5. Review of Public Comments (Attachment B)
6. Old Business
7. New Business
8. Adjourn

Attachment A: Previous Meeting Minutes

NEC® Code-Making Panel _3__ Chair Report

Signature: Robert A. Jones



Dates and Location of Meeting:

January 18-20, 2018 Hilton Head, SC

1. List names of NEC® Code-Making Panel Members in Attendance:
See attendance roster
2. List names of Guests in Attendance:
See attendance roster
3. List names of Guests who addressed the Panel, the subject of their presentation and the length of time they spoke:
Craig Roecks PIs 3330&3332 15 minutes
Marcelo Hirschler PI 1775 15 minutes
Paul Barnhart PIs 1882&1883 15 minutes
4. Number of Public Inputs/Comments acted upon:
219
5. Number of First/Second Revisions Created:
68
6. List any Task Groups appointed to work subsequent to the First/Second Draft Meeting, along with the names of Task Group members:
Same Task Groups for Public Comments
7. List any Public Input/Comment or First/Second Revision that may need to be referred to another Panel for information or correlation:
The action taken by CMP 1 via FR 8484 in response to PI 2909 from the CC Task Group for Chapter 7 and 8 may need to be addressed because CMP 3 did not delete sections 725. 24 and 760.24. Informational Note No. 3 for 110.12(C) only addresses optical fiber cables.
8. List any Public Input/Comment that requires NEC® Correlating Committee attention:
See Item 7.

CMP 3 resolved CC Task Group PIs 3979, 4281, 4306, 3967, 2883, 2912, 1971, 4305, 3971, 2884, 2913, and 4293.

PI 3330 recommended the sealing of electrical conduits entering buildings from below grade to prevent the entrance of natural gas from leaking

underground gas lines. A Task Group consisting of CMPs 3, 14, and 16 should be appointed to further study this issue.

- 9. List any general requests for information or assistance from the NEC® Correlating Committee:**

PIs 4015 and 4275 were included in the Task Group Article 760 report, these PIs were for Chapter 9 Tables 11(A) and (B). It would help to have Task Group Chapter 9 Tables 11(A) and (B) report and Task Group Chapter 9 Tables 12(A) and (B) report. Chapter 9 Tables 11&12 are not specific to Article 760.

- 10. List any issues that should be brought to the attention of the NFPA Research Foundation:**

PI 3232 recommends requiring metallic means of support above areas that are means of egress because emergency responders and building occupant safety is at risk during building fires because people can become entangled and trapped in cabling which has fallen out of molten or failing plastic supports/raceways. Additional research is needed to determine the extent of this problem and if metallic supports would eliminate the problem.

PI 3330 recommends the sealing of electrical conduits that enter the building from below grade to prevent the entrance of gas into the building.

Additional research is needed to determine the extent of gas leaking from underground gas lines and the likelihood of this gas to enter underground electrical raceways and entrance of gas into the building. The requirement to seal conduits with an identified compound to prevent the entrance of moisture and gasses will affect all occupancies.

- 11. List any additional information that would be helpful to the NEC® Correlating Committee, NFPA Staff, or process in general:**

Val Boutin and Gil Moniz did an excellent job and I would like for them to work with CMP 3 during the Second Draft meeting.

Microphones would be helpful during the panel meeting.

Code-Making Panel 3 Attendance

NEC® First Draft Meeting A2019

Principal Members in Attendance

R. Jones, <i>Chair</i>	R. Anderson	D. Bassett
L. Brewer	S. Burlison	P. Casparro
S. Clary	R. Horner	R. Ivans
C. Jones	D. Mills	S. Owen
D. Pace	C. Palmieri	

Alternate Members in Attendance

A. Corbin	M. Farrell III	J. Goergen
W. Judson	K. Krueger	J. Lupacchino
J. McNamara	T. Mikloiche	M. Ode
C. Pavese	W. Szeto	R. Templet

Staff Liaison

G. Moniz, NFPA	V. Boutin, NFPA	M. Earley, NFPA
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Guests in Attendance

M. Fontaine, NESG, Inc.	D. Stump, IEC	R. Andrew, IBEW
B. Holland, NEMA	G. Zimmerman, Ethernet Alliance, Cisco, CME Consulting	M. Hirschler, GBH Int.
J. Conrad, Marmon ITT	V. Della Croce, Siemens	E. Rodriguez, IEC
S. Kaufman, Cablesafe	T. O'Brien, Cisco	J. Dollard, IBEW
D. Williams, IAEI	A. Cronin, Strategic Code Solutions LLC	D. Hewitt, Siemen Industry Inc.
M. Holt, Mike Holt Enterprises	C. Carter, NECA	C. Roecks, Southwest Corp, Member of American Gas Assoc
T. McClintock, NFPA	K. Lofland, IAEI	P. Barnhart, UL LLC
C. Mello, CDC Mello Consulting Inc.	D. Crawford, STI	E. Hohengasser, NFPA
S. Cline, NECA		

Attachment B: Public Comment Report

**Public Comment No. 683-NFPA 70-2018 [Global Input]**

Type your content here ...~~physical~~ damage

Statement of Problem and Substantiation for Public Comment

I have to respectfully disagree with the concept that the term, "Physical damage" is well understood. My basis for this is the fact that there have been many, many attempts to define the term based on the various understandings that experienced electricians and inspectors have. Based on the committee's response to PI 1781, it appears that removing the adjective will increase the consistency of interpretation of the rules that pertain to damage, while entailing no loss.

Related Item

- Based to committee statement in reponse to PI 1781

Submitter Information Verification

Submitter Full Name: David Shapiro

Organization: Safety First Electrical

Street Address:

City:

State:

Zip:

Submittal Date: Wed Aug 15 12:34:48 EDT 2018

Committee: NEC-AAC

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Public Comment No. 979-NFPA 70-2018 [Global Input]

This Global Public Comment requests that each CMP review all products under their purview and determine whether reconditioning should be permitted. This public comment is submitted by a task group assigned by the NEC Correlating Committee. This task group was charged with reviewing Public Input 2935 which was resolved by CMP-1 during the first draft stage. This PI would have required that "Reconditioned Equipment" be "listed as "reconditioned" and the "original listing marks removed". This PI has ramifications that are global in nature and impacts all products referenced in the NEC under the purview of every CMP.

Additional Proposed Changes

<u>File Name</u>	<u>Description Approved</u>
NEMA-Position_Refubishing_on_ElecEquip.pdf	

Statement of Problem and Substantiation for Public Comment

This Public Comment is submitted on behalf of a task group appointed by the NEC® Correlating Committee. This Task Group was appointed to review the use of refurbished equipment throughout the NEC®. Task Group members are Jim Dollard, Robert Osborne, Jim Pierce, and David Williams. This task group has been charged with reviewing Public Input (PI) 2935 which was resolved by CMP-1 during the first draft stage. This PI would have required that "Reconditioned Equipment" be "listed as "reconditioned" and the "original listing marks removed". This PI has ramifications that are global in nature and impacts all products referenced in the NEC under the purview of every CMP.

Task group members noted that some types of equipment are capable of being reconditioned, then re-evaluated to ensure compliance with the applicable product standards. Other types of equipment do not lend themselves to reconditioning due to the complexity of the product, the manufacturing process, or the level of knowledge the company performing the reconditioning may need, etc.

The "NEMA Policy on Reconditioned Electrical Equipment" details the following aspects of Reconditioning of Electrical Equipment:

- Fundamental Tenets for Reconditioning Electrical Equipment
- Electrical Infrastructure and Worker Safety
- Integrity of Reconditioned Equipment
- Listing or Certification Marks
- UL Guidance on the UL Mark
- Components or Assemblies Not Suitable For Reconditioning (Appendix A)
- Components or Assemblies Which May Be Reconditioned (Appendix B)

A PDF copy of this NEMA policy is attached and may also be found on the internet at the following URL:

https://www.nema.org/Policy/Documents/NEMA-Position_Refubishing%20on%20ElecEquip.pdf

NEC® section 110.21(A)(2), which was new for the 2017 Edition of the NEC®, included marking requirements for "Reconditioned Equipment". PI 2935 would have required that "Reconditioned Equipment" be "listed as "reconditioned" and the "original listing marks removed". CMP 1 resolved this PI. Due to the global nature of PI 2935 this Task Group, appointed by the NEC® Correlating Committee, has developed a number of Public Comments, based on the products identified in the referenced NEMA document, to determine whether or not equipment can be reconditioned, and if reconditioned, what additional requirements apply.

While several Public Comments were developed for specific equipment by this task group, not all equipment was addressed (neither was all the equipment noted in the NEMA Policy document addressed). This Global Public

Comment requests each CMP to review the products required to be listed under their purview and determine whether reconditioning should be permitted. It is recommended that the NEMA Policy document be used as one of the guidelines in making this determination. It is also recommended that one of the following options/examples be chosen for listed equipment:

Option 1 - Equipment NOT suitable for Reconditioning (EXAMPLE):

695.10 Listed Equipment. Diesel engine fire pump controllers, electric fire pump controllers, electric motors, fire pump power transfer switches, foam pump controllers, and limited service controllers shall be listed for fire pump service. [20:9.5.1.1, 10.1.2.1, 12.1.3.1]

Fire pump controllers and transfer switches shall not be permitted to be reconditioned.

Option 2 - Equipment which MAY BE suitable for Reconditioning (EXAMPLE):

408.8 Reconditioned Equipment.

(A) Panelboards. The use of reconditioned panelboards shall comply with (1) and (2):

(1) Industrial and commercial panelboards shall be permitted to be reconditioned. Reconditioned equipment shall be listed as "reconditioned" and the original listing mark removed.

(2) Panelboards installed in dwelling units shall not be permitted to be reconditioned.

(B) Switchboards and Switchgear. Low voltage switchgear, medium voltage switchgear and switchboards shall be permitted to be reconditioned. Reconditioned equipment shall be listed as "reconditioned" and the original listing mark removed.

Note that equipment where no specific guidance is provided would be permitted to be reconditioned and would only be required to meet the marking requirements in 110.21(A)(2).

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 980-NFPA 70-2018 [New Section after 240.87(B)]	
Public Comment No. 981-NFPA 70-2018 [New Section after 240.61]	
Public Comment No. 982-NFPA 70-2018 [New Section after 240.101(B)]	
Public Comment No. 983-NFPA 70-2018 [Section No. 695.10]	
Public Comment No. 984-NFPA 70-2018 [Section No. 700.5(C)]	
Public Comment No. 985-NFPA 70-2018 [Section No. 701.5(C)]	
Public Comment No. 986-NFPA 70-2018 [Section No. 702.5]	
Public Comment No. 987-NFPA 70-2018 [New Section after 408.7]	

Related Item

- PI 2935

Submitter Information Verification

Submitter Full Name: James Dollard

Organization: IBEW Local Union 98

Street Address:

City:

State:

Zip:**Submittal Date:** Tue Aug 21 08:08:39 EDT 2018**Committee:** NEC-AAC**Copyright Assignment**

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NEMA Policy on Reconditioned Electrical Equipment

Executive Summary:

The option of reconditioning existing equipment (instead of purchasing new equipment) exists today. Proper electrical equipment reconditioning provides a means to extend the life of electrical products as well as an opportunity in some cases to update installed equipment with the latest performance and safety features. However, not all components of the electrical infrastructure are candidates for reconditioning.

There are a number of precautions that must be adhered to when reconditioning electrical equipment if that equipment is to operate safely and with acceptable performance. Those precautions are discussed below and include the use of design qualified parts, testing to industry-recognized safety standards, original manufacturer specification and/or recommendations, when possible, and reconditioning performed by qualified personnel. The integrity of reconditioned electrical equipment must be established by documenting and demonstrating that component replacement has not compromised the manufacturer's original specifications and accepted industry standards.

The third party certification mark must be removed or obliterated from reconditioned electrical products to indicate that an evaluation of the reconditioning process or reconditioned product has not been conducted by the original third party.

As guidance, Appendix B provides a list of electrical products and components that are considered by NEMA suitable for reconditioning and Appendix A provides a list of electrical products considered not suitable for reconditioning. Medical Imaging Equipment is specifically not addressed by this policy (reference MITA 1, Good Refurbishment Practices for Medical Imaging Equipment).

Introduction:

The U.S. electrical industry includes discussions on implementing new technologies to enhance existing electrical infrastructure. Further, sustainability and safeguarding the environment are growing in importance. In the midst of this is the option for reconditioning existing equipment. Paramount in all this is the fundamental priority that all electrical systems operate while safe-guarding personnel and infrastructure from potential hazards (electrical, mechanical, fire, etc.). This forms the basis for the NEMA position on reconditioning electrical products.

Given that electrical systems are diverse in design, function, and application, not all components of the electrical infrastructure are candidates for reconditioning.

Definition:

Reconditioning: the process of restoring electromechanical systems, equipment, apparatus or components to operating conditions as recommended by the

manufacturer's instructions, using only design qualified parts. Reverse engineered parts (designs copied from existing parts by other manufacturers) are not considered to be "design qualified parts" unless specifically design verified under applicable Standards. Electrical industry practitioners and other organizations may also use the following terms/words to describe the process of reconditioning: remanufacturing, refurbishing, recycling, repairing, restoring, rebuilding, reengineering, and reusing.

In addition to design considerations, it is often impossible to obtain the service records, application environment, and operation parameters of all electrical components. Not having access to such information could have an adverse impact on the final safety and reliability of refurbished or reconditioned equipment. While NEMA supports the reconditioning of some electrical equipment, the components listed in Appendix A are not recommended for reconditioning, unless otherwise indicated by the original manufacturer. Normal servicing of equipment that remains within a facility should not be considered reconditioning or refurbishing. For electrical components suitable for reconditioning listed in Appendix B, the following fundamental tenets have been established.

Fundamental Tenets for Reconditioning Electrical Equipment

- Reconditioning electrical equipment may be a viable option for extending operational lifetime of equipment and enhancing equipment with additional features.
- Electrical equipment reconditioning activity must be based on available guidance documentation from the Original Equipment Manufacturer, or industry-developed standards. Where any conflict in guidance is noted between the OEM and industry standards, the OEM guidance should take precedence.
- Electrical equipment must be reconditioned and qualified to an industry-developed standard that ensures equipment is in a usable and safe operating condition. An industry-developed standard is a widely agreed upon rule, set of rules, procedures or requirements for a product, assembly or process which are developed by members or organizations of an aggregate of manufacturing and technically productive enterprises in a particular field. Products deemed to be candidates for reconditioning must be reconditioned and qualified to industry standards containing the most relevant and critical design aspects, testing criteria and manufacturing specifications when the item was built.
- Reconditioning work must be performed by qualified personnel.
- Electrical equipment that has been exposed to adverse conditions, such as fire, water damage, etc., may not be suitable for reconditioning.
- A comprehensive assessment of the electrical equipment being considered for reconditioning with service records, application, environment, service life, and operating parameters is critical before deciding to pursue reconditioning of the electrical equipment and system. Trained, skilled technicians should be able to assess whether a device or system is suitable for reconditioning through physical inspection and test.
- Appendix A provides guidance on which components or assemblies of the electrical system are not suitable for reconditioning because they may pose a

hazard. Appendix B provides guidance on the components or assemblies are suitable for reconditioning.

- Reconditioning electrical equipment must utilize electrical product safety standards as they contain design aspects, testing criteria and manufacturing specifications to ensure a given product will function as intended. These requirements are established to deliver a usable and safe operating condition as a key component of intended product functionality.

Electrical Infrastructure and Worker Safety

Electrical equipment that is properly installed, tested, maintained, and operated will provide reliable power as well as protect the electrical infrastructure. The reconditioning of electrical equipment requires the electrical industry, in collaboration with manufacturers, to establish performance specifications and accepted industry standards to help ensure safe and reliable equipment that help protect our electrical infrastructure so workers and users can continue to benefit from a safe and effective electrical system. Reconditioning standards must include prescriptive actions and performance requirements that result in equipment that complies with standards that include but are not limited to CSA, IEC, IEEE, NEC, OSHA, NFPA 70E, NFPA 70B, NETA ATS, NETA MTS, and EASA AR100 for example. Qualified personnel must possess the knowledge of how to assess equipment condition, potential hazards, and specifications to accurately determine the suitability for reconditioning. A safe and reliable electrical infrastructure that can be safely maintained is dependent on compliance with manufacturers' instructions, qualified workers, proper maintenance, and accepted industry standards for reconditioning activities.

Electrical Equipment Reliability, Performance and Safety

Proper electrical equipment reconditioning provides a means to extend the life of electrical products as well as an opportunity to update installed equipment with the latest performance and safety features. Establishing well defined guidelines for those performing the reconditioning activity, based on original manufacturer's requirements, creates a solid foundation for the electrical industry and users. It is paramount that reconditioned electrical equipment be reliable in not only providing power, but also in safely performing its intended function as part of a safe operating electrical system. Understanding the environment, electrical load characteristics and historical maintenance performed on equipment being considered for reconditioning are all important parts of an assessment for reconditioning that can have a significant bearing on reliability, performance and safety. The electrical equipment manufacturer is the foremost authority on the design, performance and intended safe application of their product. Reconditioned electrical equipment must not compromise the reliability, performance, safe operation, or maintenance of the electrical system.

Integrity of Reconditioned Equipment

Reconditioned electrical equipment must comply with all applicable standards at the time the equipment was initially built as a minimum as well as the original manufacturer's performance requirements in accordance with the nameplate markings and ratings. Replacement parts shall meet the design criteria (form, fit, and function) for the device to perform its intended function and provide safe operation. Replacement parts shall not include counterfeit parts (i.e., parts that have been misrepresented to be an authorized item of the legally authorized source.) Equipment shall operate safely in its intended application after reconditioning occurs. Care must be taken to ensure specific operations such as timing, sequencing, control, transfer, etc. continue to function in the manner originally intended, unless changes are specified during the reconditioning process. The integrity of reconditioned electrical equipment must be established by documenting and demonstrating that component replacement and performance changes have not compromised the manufacturer's specifications and accepted industry standards.

Listing or Certification Marks

NEMA members manufacture products that are more than likely to be evaluated as part of a third party certification program to nationally recognized safety standards. These products can be marked with a listing or certification mark when the products are manufactured and shipped from the factory. The organization that reconditions the product is responsible for adhering to the guidelines from the issuing agency authorizing the mark to determine if the mark can remain on the product after reconditioning. The organization that reconditions is responsible for any actions necessary for the mark to remain on the product (analysis, testing, etc.). Otherwise, reconditioned electrical products must have their mark removed or obliterated to indicate that an evaluation of the reconditioning process has not been conducted by the original third party.

The organization that reconditions the product is additionally responsible for applying a mark or seal that indicates that the equipment has been reconditioned. This mark must provide traceability to the reconditioning organization in the event that it is necessary to determine the details of who reconditioned the equipment and the report on what was completed during this process.

There are a number of NEMA products that are not allowed to be reconditioned due to the inherent safety characteristics and requirements for those products to be evaluated according to a regular follow up program to evaluate the safety performance requirements as a condition of maintaining the listing or certification mark. This process cannot be applied to reconditioned electrical products since these are normally destructive tests and sample sets of reconditioned products are not possible due to limited quantities or ratings of specific devices.

UL Guidance on the UL Mark

When the manufacturer places the UL Mark on the product at the factory, it is their attestation that the product complies with the applicable requirements. Unless there is further oversight or review/inspection (field inspection) UL cannot ascertain that the

product continues to comply with all requirements should field repairs, modifications or component replacements be made to the product.

Obviously there is little control over what manufacturers will or can do to equipment which left the factory with a certification mark. UL has created rebuilt categories where the reconditioning of product is done in an organized consistent manner under the supervision of UL's FUS (Follow-Up Services) field representatives. In these cases the first action conducted with equipment being rebuilt is the removal of the initial certification mark (if provided). Upon completion of the reconditioning, in accordance with the surveillance document, the manufacturer is permitted to affix a mark which clearly identifies the product as reconditioned.

Cases where a reconditioner is instructed to NOT remove any certification mark will result in confusion. Clearly such equipment in the field, which has undergone modification or reconditioning, is ineligible to bear a mark which designates a compliance with a certification standard.

APPENDIX A

COMPONENTS OR ASSEMBLIES NOT SUITABLE FOR RECONDITIONING*

Adjustable speed drives
Arc fault circuit breakers
Ballasts
Busway (mylar wrapped)
Busway (powder coated)
Cable tray
Cast resin transformers
Components containing semiconductors and transistors
Control transformers
Dry type transformers
Electrical Connectors
Electrical submetering equipment
Electrical vehicle supply equipment
Enclosed switches
Fire detectors, smoke alarms, co detectors
Fire pump controllers
Flexible and extension cords
Flexible conduit
Ground fault circuit breakers
High performance wire and cable
Lighting controls
Liquid filled transformers
Low and medium voltage fuse holders
Low and medium voltage non-renewable fuses
Low voltage power circuit breaker electronic trip units
Luminaires
Meters (electromechanical, electronic or digital)
Meter sockets
Molded case circuit breakers
Non-Metallic conduit, tubing, raceways and fittings
Non-metallic surface raceways and fittings
Outlet and junction boxes
Overload relays
Pin and sleeve plugs receptacles and connectors
Power and control cable
Protective relays (electronic or digital)
Residential panel boards
Solid state contactors and starters
Solid state drives
Strut type channel raceway
Surface metal raceways and fittings
Surge protective devices
Transfer switches
Wire or cable
Wireway
Wiring devices

*The components or products listed above are not recommended for reconditioning, unless otherwise indicated by the original manufacturer.

APPENDIX B

COMPONENTS OR ASSEMBLIES WHICH MAY BE RECONDITIONED

Electromechanical protective relays, and current transformers
High voltage circuit breakers
Industrial and commercial panel boards
Low and medium voltage power circuit breakers
Low and medium voltage replaceable link fuses
Low voltage switchgear
Manual and magnetic controllers
Medium voltage switchgear
Metallic conduit, tubing, raceways and fittings
Motor control centers
Motors
Switchboards
Uninterruptible Power Supply Equipment

**Public Comment No. 2208-NFPA 70-2018 [Global Input]**

The Correlating Committee directs Panel 3 to review all references to Article 310 under their purview. Article 310 has been divided into Article 310,

Conductors for General Wiring, and Article 311, Medium Voltage Conductors and Cables for usability and clarity. Panel 3 shall appoint a task group

to review all necessary references to verify their accuracy and submit Public Comments where necessary. This action instructs Panel 3 to

submit a Public Comment(s) within the time frame required in the NEC schedule.

This action shall be considered as a public comment.

Additional Proposed Changes

<u>File Name</u>	<u>Description Approved</u>
CN_270.pdf	CN_270

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as CC Note No. 270 in the First Draft Report.

The Correlating Committee directs Panel 3 to review all references to Article 310 under their purview. Article 310 has been divided into Article 310,

Conductors for General Wiring, and Article 311, Medium Voltage Conductors and Cables for usability and clarity. Panel 3 shall appoint a task group

to review all necessary references to verify their accuracy and submit Public Comments where necessary. This action instructs Panel 3 to

submit a Public Comment(s) within the time frame required in the NEC schedule.

This action shall be considered as a public comment.

Related Item

- Correlating Committee Note No. 270

Submitter Information Verification

Submitter Full Name: CC on NEC-AAC

Organization: NEC Correlating Committee

Street Address:

City:

State:

Zip:

Submittal Date: Fri Sep 07 13:47:09 EDT 2018

Committee: NEC-P03

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**Correlating Committee Note No. 270-NFPA 70-2018 [Global Input]****Submitter Information Verification**

Submitter Full Name: Sarah Caldwell

Committee:

Submittal Date: Fri May 11 17:54:55 EDT 2018

Committee Statement and Meeting Notes

Committee Statement: The Correlating Committee directs all panels to review all references to Article 310 under their purview. Article 310 has been divided into Article 310, Conductors for General Wiring, and Article 311, Medium Voltage Conductors and Cables for usability and clarity. Each panel shall appoint a task group to review all necessary references to verify their accuracy and submit Public Comments where necessary. This action instructs the referenced panels to submit a Public Comment(s) within the time frame required in the NEC schedule.

This action shall be considered as a public comment.

Ballot Results

✔ This item has passed ballot

12 Eligible Voters

0 Not Returned

12 Affirmative All

0 Affirmative with Comments

0 Negative with Comments

0 Abstention

Affirmative All

Brunssen, James E.

Dressman, Kevin L.

Hickman, Palmer L.

Hittinger, David L.

Holub, Richard A.

Johnston, Michael J.

Kovacik, John R.

Manche, Alan

McDaniel, Roger D.

Pierce, James F.

Saporita, Vincent J.

Williams, David A.

**Public Comment No. 2225-NFPA 70-2018 [Global Input]**

The Correlating Committee directs Panel 3 to review all Articles, within their purview, that supplement or modify (90.3) GFCI requirements in 210.8 for correlation, clarity, usability and standardized format. A Correlating Committee Task Group will be appointed and will submit comments where necessary.

This action shall be considered as a public comment.

Additional Proposed Changes

<u>File Name</u>	<u>Description Approved</u>
CN_152.pdf	CN_152

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as CC Note No. 152 in the First Draft Report.

The Correlating Committee directs Panel 3 to review all Articles, within their purview, that supplement or modify (90.3) GFCI requirements in 210.8 for correlation, clarity, usability and standardized format. A Correlating Committee Task Group will be appointed and will submit comments where necessary.

This action shall be considered as a public comment.

Related Item

- Correlating Committee Note No. 152

Submitter Information Verification

Submitter Full Name: CC on NEC-AAC

Organization: NEC Correlating Committee

Street Address:

City:

State:

Zip:

Submittal Date: Fri Sep 07 14:38:44 EDT 2018

Committee: NEC-P03

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Correlating Committee Note No. 152-NFPA 70-2018 [Global Input]

Submitter Information Verification

Submitter Full Name: Erik Hohengasser

Committee:

Submittal Date: Thu May 10 18:00:52 EDT 2018

Committee Statement

Committee Statement: The Correlating Committee directs each panel to review all Articles, within their purview, that supplement or modify (90.3) GFCI requirements in 210.8 for correlation, clarity, usability and standardized format. A Correlating Committee Task Group will be appointed and will submit comments where necessary.

This action shall be considered as a public comment.

Ballot Results

✔ **This item has passed ballot**

12 Eligible Voters

0 Not Returned

12 Affirmative All

0 Affirmative with Comments

0 Negative with Comments

0 Abstention

Affirmative All

Brunssen, James E.

Dressman, Kevin L.

Hickman, Palmer L.

Hittinger, David L.

Holub, Richard A.

Johnston, Michael J.

Kovacik, John R.

Manche, Alan

McDaniel, Roger D.

Pierce, James F.

Saporita, Vincent J.

Williams, David A.



Public Comment No. 768-NFPA 70-2018 [Global Input]

It was the action of the Correlating Committee to direct Panel 3 to correlate FR-8790 and FR-7892 with Panel 16.

This action will be considered as a public comment.

Additional Proposed Changes

<u>File Name</u>	<u>Description Approved</u>
-------------------------	------------------------------------

CCN_145.pdf 70_CN145

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as CC Note No. 145 in the First Draft Report on First Revision No. 8117.

It was the action of the Correlating Committee to direct Panel 3 to correlate FR-8790 and FR-7892 with Panel 16.

This action will be considered as a public comment.

Related Item

- First Revision No. 8117

Submitter Information Verification

Submitter Full Name: CC on NEC-AAC

Organization: NEC CORRELATING COMMITTEE

Street Address:

City:

State:

Zip:

Submittal Date: Fri Aug 17 10:42:52 EDT 2018

Committee: NEC-P03

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**Correlating Committee Note No. 145-NFPA 70-2018 [Global Input]****Submitter Information Verification**

Submitter Full Name: Erik Hohengasser

Committee:

Submittal Date: Thu May 10 17:11:41 EDT 2018

Committee Statement and Meeting Notes

Committee Statement: It was the action of the Correlating Committee to direct that FR-8790 and FR-7892 be correlated between CMP-3 and CMP-16.

This action will be considered as a public comment.

First Revision No. 8117-NFPA 70-2018 [Global Input]

Ballot Results

✔ This item has passed ballot

12 Eligible Voters

0 Not Returned

12 Affirmative All

0 Affirmative with Comments

0 Negative with Comments

0 Abstention

Affirmative All

Brunssen, James E.

Dressman, Kevin L.

Hickman, Palmer L.

Hittinger, David L.

Holub, Richard A.

Johnston, Michael J.

Kovacik, John R.

Manche, Alan

McDaniel, Roger D.

Pierce, James F.

Saporita, Vincent J.

Williams, David A.

**Public Comment No. 225-NFPA 70-2018 [Section No. 300.3(B)(1)]****(1) Paralleled Installations.**

Conductors shall be permitted to be run in parallel in accordance with the provisions of 310.10(G). The requirement to run all circuit conductors within the same raceway, auxiliary gutter, cable tray, trench, cable, or cord shall apply separately to each portion of the paralleled installation, and the equipment grounding conductors shall comply with the provisions of 250.122. Connections, taps or extensions from conductors that are connected in parallel shall include each individual conductor making up the parallel conductor. Parallel runs in cable trays shall comply with the requirements of 392.20(C).

Exception: Conductors installed in nonmetallic raceways run underground shall be permitted to be arranged as isolated phase, neutral, and grounded conductor installations. The raceways shall be installed in close proximity, and the isolated phase, neutral, and grounded conductors shall comply with the provisions of 300.20(B).

Statement of Problem and Substantiation for Public Comment

There is a problem with some installers understanding 310.10(H) as far as connecting to parallel conductors.

About five years ago the Chief Electrical Inspector for the City of Houston brought up the problem of electrical contractors connecting to parallel service conductors for additional services in strip centers (multi-tenant occupancies). For instance, a gutter may have parallel 500 kcmil service conductors from the utility source and the contractor would connect to one of the 500s because the service being installed was 400 amps. Just to be clear, these connections are not taps because these are service conductors. This problem was addressed by requirements added to the Houston Electrical Code and additions were made to the Utility Company Service Standards.

Section 310.10(H) details what must be done for paralleling conductors; however, there are no requirements for connections to parallel conductors. Individuals with a good understanding of the Code know that when conductors are connected in parallel the conductors are now one conductor. Connecting to one conductor of a parallel group would be the same as connecting to half or a third of the strands of perhaps a 500 kcmil THWN copper conductor. Since a 500 kcmil THWN copper conductor has an ampacity of 380 amps then half of the strands should be able to carry 190 amps.

The problem is with individuals not properly trained and sometimes that includes AHJs. The proposed Code text clearly requires connecting to all conductors in a parallel group. This revision will make the NEC more user friendly and possibly help in educating people on Code requirements.

Related Item

- PI 3317

Submitter Information Verification

Submitter Full Name: David Hittinger

Organization: IEC

Affiliation: Independent Electrical Contractors, Inc.

Street Address:

City:

State:

Zip:

Submission Date: Mon Jul 16 13:49:21 EDT 2018

Committee: NEC-P03

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**Public Comment No. 280-NFPA 70-2018 [Section No. 300.3(B)(1)]****(1) Paralleled Installations.**

Conductors shall be permitted to be run in parallel in accordance with the provisions of 310.10(G). The requirement to run all circuit conductors within the same raceway, auxiliary gutter, cable tray, trench, cable, or cord shall apply separately to each portion of the paralleled installation, and the equipment grounding conductors shall comply with the provisions of 250.122. Connection, taps or extensions from conductors that are connected in parallel shall be made in such a manner that current is equalized in the parallel conductors. Parallel runs in cable trays shall comply with the requirements of 392.20(C).

Exception: Conductors installed in nonmetallic raceways run underground shall be permitted to be arranged as isolated phase, neutral, and grounded conductor installations. The raceways shall be installed in close proximity, and the isolated phase, neutral, and grounded conductors shall comply with the provisions of 300.20(B).

Additional Proposed Changes

<u>File Name</u>	<u>Description Approved</u>
300.03B1.jpg	

Statement of Problem and Substantiation for Public Comment

I acknowledge that the requirements for installing conductors in parallel are in 310.10(H). These rules ensure that the conductors that are connected in parallel carry equal current. This is important because, usually, none of the conductors individually is capable of carrying all of the current permitted by the overcurrent device. An identical concept exists where service-entrance conductors are installed for more than one disconnecting means as provided in 230.90(A) Exception No. 3.

However, so far as I can tell, there is no rule that states that taps or similar connections to a set of conductors that is connected in parallel must be made in a manner that maintains equal current in each of the conductors.

For example, if two 250 kcmil or other suitable conductors are connected in parallel, there is no rule in the present NEC that prevents an installer from connecting a tap to one of the two conductors. Doing so would obviously defeat the safeguards in 310.10(H).

I understand that to ensure safety in services consisting of more than one service disconnecting means connected to the same service lateral, some electric utilities require the installation of a short-run busway (I believe UP refers to these as "terminal boxes").

This proposed change is important to ensure safety and should be accepted.

Related Item

• 3317

Submitter Information Verification

Submitter Full Name: Phil Simmons

Organization: Simmons Electrical Services

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jul 23 17:59:36 EDT 2018

Committee: NEC-P03

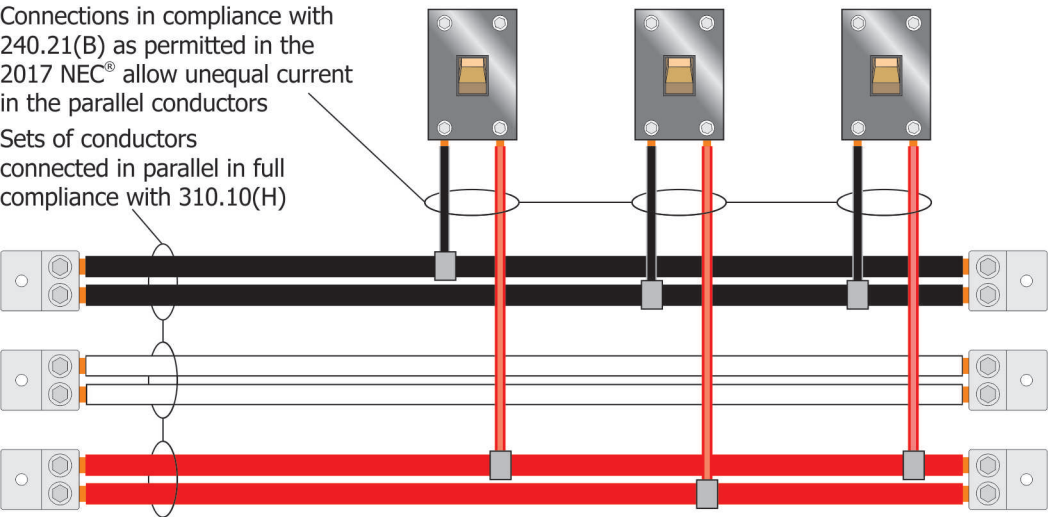
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Connections in compliance with 240.21(B) as permitted in the 2017 NEC® allow unequal current in the parallel conductors

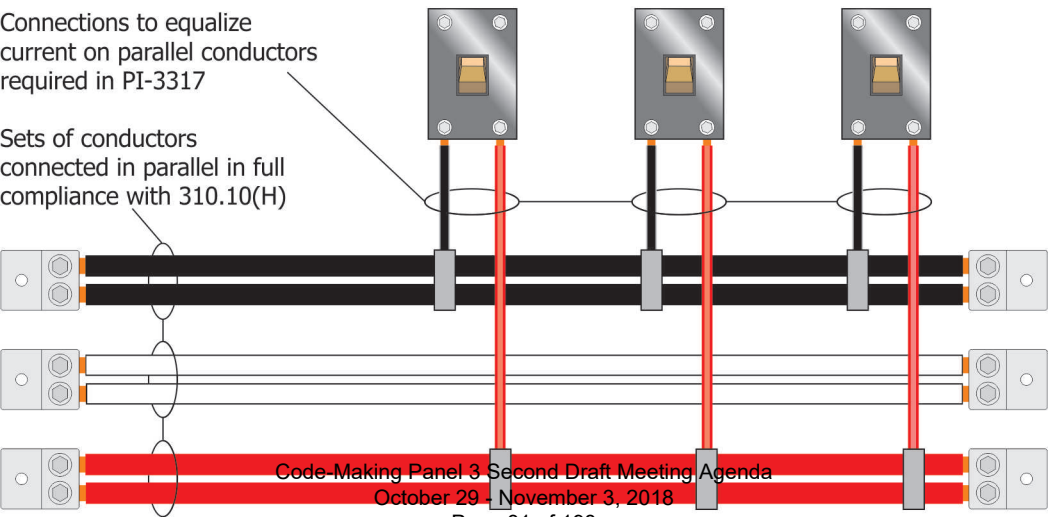
Sets of conductors connected in parallel in full compliance with 310.10(H)



Connections typically made in a wireway or auxiliary gutter.

Connections to equalize current on parallel conductors required in PI-3317

Sets of conductors connected in parallel in full compliance with 310.10(H)



Connections typically made in a wireway or auxiliary gutter.

**Public Comment No. 645-NFPA 70-2018 [Section No. 300.3(B)(1)]****(1) Paralleled Installations.**

Conductors shall be permitted to be run in parallel in accordance with the provisions of 310.10(G). The requirement to run all circuit conductors within the same raceway, auxiliary gutter, cable tray, trench, cable, or cord shall apply separately to each portion of the paralleled installation, and the equipment grounding conductors shall comply with the provisions of 250.122. Parallel runs in cable trays shall comply with the requirements of 392.20(C).

Exception: Conductors installed in nonmetallic raceways run underground shall be permitted to be arranged as isolated phase, neutral, and grounded conductor installations. The raceways shall be installed in close proximity, and the isolated phase, neutral, and grounded conductors shall comply with the provisions of 300.20(B).

Statement of Problem and Substantiation for Public Comment

"the provision of" needed to be remove from the exception. "the requirements of" is unneeded text.

Related Item

- FR 8649

Submitter Information Verification

Submitter Full Name: David Kendall

Organization: Thomas & Betts Corporation

Street Address:

City:

State:

Zip:

Submittal Date: Tue Aug 14 14:22:47 EDT 2018

Committee: NEC-P03

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**Public Comment No. 650-NFPA 70-2018 [Section No. 300.3(B)(3)]****(3) Nonferrous Wiring Methods.**

Conductors in wiring methods with a nonmetallic or other nonmagnetic sheath, where run in different raceways, auxiliary gutters, cable trays, trenches, cables, or cords, shall comply with the provisions of 300.20(B). Conductors in single-conductor Type MI cable with a nonmagnetic sheath shall comply with the provisions of 332.31. Conductors of single-conductor Type MC cable with a nonmagnetic sheath shall comply with the provisions of ~~with~~ 330.31, 330.116, and 300.20(B).

Statement of Problem and Substantiation for Public Comment

"the provision of" needed to be removed.

Related Item

- FR 8649

Submitter Information Verification

Submitter Full Name: David Kendall

Organization: Thomas & Betts Corporation

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City:

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Submittal Date: Tue Aug 14 15:10:36 EDT 2018

Committee: NEC-P03

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**Public Comment No. 505-NFPA 70-2018 [Section No. 300.4]****300.4 Protection Against Physical Damage.**

Where subject to physical damage, conductors, raceways, and cables shall be protected.

(A) Cables and Raceways Through Wood Members.**(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 conduit, 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.

(2) Notches in Wood.

Where there is no objection because of weakening the building structure, in both exposed and concealed locations, cables or raceways shall be permitted to be laid in notches in wood studs, joists, rafters, or other wood members where the cable or raceway at those points is protected against nails or screws by a steel plate at least 1.6 mm (⅙ in.) thick, and of appropriate length and width, installed to cover the area of the wiring. The steel plate shall be installed before the building finish is applied.

Exception No. 1: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, 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.

(B) Nonmetallic-Sheathed Cables and Electrical Nonmetallic Tubing Through Metal Framing Members.**(1) Nonmetallic-Sheathed Cable.**

In both exposed and concealed locations where nonmetallic-sheathed cables pass through either factory- or field-punched, cut, or drilled slots or holes in metal members, the cable shall be protected by listed bushings or listed grommets covering all metal edges that are securely fastened in the opening prior to installation of the cable.

(2) Nonmetallic-Sheathed Cable and Electrical Nonmetallic Tubing.

Where nails or screws are likely to penetrate nonmetallic-sheathed cable or electrical nonmetallic tubing, a steel sleeve, steel plate, or steel clip not less than 1.6 mm (⅙ in.) in thickness shall be used to protect the cable or tubing.

Exception: 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.

(C) Cables Through Spaces Behind Panels Designed to Allow Access.

Cables or raceway-type wiring methods, installed behind panels designed to allow access, shall be supported according to their applicable articles.

(D) Cables and Raceways Parallel to Framing Members and Furring Strips.

In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed parallel to framing members, such as joists, rafters, or studs, or is installed parallel to furring strips, the cable or raceway shall be installed and supported so that the nearest outside surface of the cable or raceway is not less than 32 mm (1¼ in.) from the nearest edge of the framing member or furring strips where nails or screws are likely to penetrate. Where this distance cannot be maintained, the cable or raceway shall be protected from penetration by nails or screws by a steel plate, sleeve, or equivalent at least 1.6 mm (⅙ in.) thick.

Exception No. 1: Steel plates, sleeves, or the equivalent shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, or electrical metallic tubing.

Exception No. 2: For concealed work in finished buildings, or finished panels for prefabricated buildings where such supporting is impracticable, it shall be permissible to fish the cables between access points.

Exception No. 3: 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.

(E) Cables, Raceways, or Boxes Installed in or Under 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 be penetrated by the screws or other mechanical devices designed to provide "hold down" strength of the waterproof membrane or roof insulating material.

Exception: Rigid metal conduit and intermediate metal conduit shall not be required to comply with 300.4(E).

(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 (⅙ in.) thick steel plate, sleeve, or equivalent or by not less than 32-mm (1¼-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, 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.

(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, the conductors shall be protected by an identified fitting providing a smoothly rounded insulating surface or a listed metal fitting that has smoothly rounded edges, unless the conductors are separated from the fitting or raceway by identified insulating material that is securely fastened in place.

Exception: Where threaded hubs or bosses that are an integral part of a cabinet, box, enclosure, or raceway provide 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.

(H) Structural Joints.

A listed expansion/deflection fitting or other approved means shall be used where a raceway crosses a structural joint intended for expansion, contraction or deflection, used in buildings, bridges, parking garages, or other structures.

Statement of Problem and Substantiation for Public Comment

Continue retaining the term "rigid nonmetallic conduit" instead of PVC conduit because "rigid nonmetallic conduit" is still used in the code and it applies not just to PVC but also to RTRC and to HDPE conduits.

Related Item

- PI2631

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler

Organization: GBH International

Street Address:

City:

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Zip:

Submittal Date: Thu Aug 09 15:42:38 EDT 2018

Committee: NEC-P03

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Public Comment No. 903-NFPA 70-2018 [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, the conductors shall be protected by an identified fitting providing a smoothly rounded insulating surface or a listed metal fitting that has smoothly rounded edges, unless the conductors are separated from the fitting or raceway by identified insulating material that is securely fastened in place.

Exception: Where threaded hubs or bosses that are an integral part of a cabinet, box, enclosure, or raceway provide 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.

Additional Proposed Changes

<u>File Name</u>	<u>Description Approved</u>
CN_140.pdf	70_CN 140

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as CC Note No. 140 in the First Draft Report on First Revision No. 8667.

The Correlating Committee directs this first revision be rewritten to comply with the NEC Style Manual. Revise the Exception to become a complete sentence in mandatory language in accordance with the NEC Style Manual requirements.

This action will be considered as a public comment.

Related Item

- FR 8667

Submitter Information Verification

Submitter Full Name: CC on NEC-AAC

Organization: NEC Correlating Committee

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City:

State:

Zip:

Submittal Date: Mon Aug 20 15:21:46 EDT 2018

Committee: NEC-P03

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Correlating Committee Note No. 140-NFPA 70-2018 [Section No. 300.4(G)]

Submitter Information Verification

Submitter Full Name: Erik Hohengasser

Committee:

Submittal Date: Thu May 10 16:43:59 EDT 2018

Committee Statement and Meeting Notes

Committee Statement: The Correlating Committee directs this first revision be rewritten to comply with the NEC Style Manual. Revise the Exception to become a complete sentence in mandatory language in accordance with the NEC Style Manual requirements.

This action will be considered as a public comment.

First Revision No. 8667-NFPA 70-2018 [Section No. 300.4(G)]

Ballot Results

✓ **This item has passed ballot**

12 Eligible Voters

0 Not Returned

12 Affirmative All

0 Affirmative with Comments

0 Negative with Comments

0 Abstention

Affirmative All

Brunssen, James E.

Dressman, Kevin L.

Hickman, Palmer L.

Hittinger, David L.

Holub, Richard A.

Johnston, Michael J.

Kovacik, John R.

Manche, Alan

McDaniel, Roger D.

Pierce, James F.

Saporita, Vincent J.

Williams, David A.



Public Comment No. 952-NFPA 70-2018 [Section No. 300.5(D)(3)]

~~(3)–Service Conductors.~~

~~Underground service~~

Underground Circuit Conductors 120 volts to Ground and Greater

~~Service, feeder, and branch circuit~~ conductors that are not encased in concrete and that are buried 450 mm (18 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 underground installation.

Statement of Problem and Substantiation for Public Comment

The NEC Handbook tells us that this ribbon is not required for feeders or branch circuits because unlike service conductors these have short circuit and overload protection. Throughout the NEC we go to great lengths to provide physical protection of electrical conductors so it's difficult to find logic with the reason given in the NEC Handbook. A warning ribbon installed at the proper height above the conductors provides a higher degree of safety. It also can be a great value for so little cost considering repairs and down time in the event these conductors are hit. A warning ribbon including feeders and branch is one more sensible precaution in preventing ground faults or short circuits.

Note: Depending on the demarcation location, an electrical inspector may have little jurisdiction on what happens on the line side of the service point of connection, therefore, little say on the service conductors' installation.

Related Item

- 300.5D3

Submitter Information Verification

Submitter Full Name: Norman Feck

Organization: State of Colorado

Street Address:

City:

State:

Zip:

Submittal Date: Mon Aug 20 18:16:50 EDT 2018

Committee: NEC-P03

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**Public Comment No. 1126-NFPA 70-2018 [Section No. 300.5(G)]****(G) Raceway Seals.**

Conduits or raceways through which moisture may contact live parts shall be sealed or plugged at either or both ends. Spare or unused raceways shall also be sealed. All conduits or raceways entering a building or structure shall be sealed at the end within the building or structure. Sealants shall be identified for use with the cable insulation, conductor insulation, bare conductor, shield, or other components.

~~Informational Note: Presence of hazardous gases or vapors may also necessitate sealing of underground conduits or raceways entering buildings.~~

Explosionproof seals shall not be required for this purpose.

Statement of Problem and Substantiation for Public Comment

I agree with the supporting statement in Public Comment 444, which I adopt by reference

Related Item

- Public Comment 444; Public Input 3330-NFPA 70-2017

Submitter Information Verification

Submitter Full Name: Craig Roecks

Organization: Southwest Gas Corporation

Street Address:

City:

State:

Zip:

Submittal Date: Thu Aug 23 14:18:07 EDT 2018

Committee: NEC-P03

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**Public Comment No. 1167-NFPA 70-2018 [Section No. 300.5(G)]****(G) Raceway Seals.**

Conduits or raceways through which moisture may contact live parts shall be sealed or plugged at either or both ends. Spare or unused raceways shall also be sealed. Sealants shall be identified for use with the cable insulation, conductor insulation, bare conductor, shield, or other components.

Informational Note: Presence of hazardous gases or vapors may also necessitate sealing of underground conduits or raceways entering buildings.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
APGA_letter_Comments_and_Recommendations_for_the_NFPA_70-2020.pdf	Letter of support for AGA's edits to Section No. 300.5(G)]	

Statement of Problem and Substantiation for Public Comment

Underground conduits and raceways installed at the transition between two nonhazardous unclassified areas will substantially increase the spread of underground hazards such as a leak from an underground natural gas pipe into buildings when those conduits are not sealed. NFPA 70 does not require all underground conduit installations to be sealed and so it currently allows conduits to propagate hazards into buildings. This proposal fixes that.

Related Item

- Public Comment No. 444-NFPA 70-2020 [Section No. 300.5(G)]

Submitter Information Verification

Submitter Full Name: Daniel Lapato

Organization: AMERICAN PUBLIC GAS ASSOC

Street Address:

City:

State:

Zip:

Submission Date: Fri Aug 24 09:22:32 EDT 2018

Committee: NEC-P03

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AMERICAN PUBLIC GAS ASSOCIATION

August 24, 2018

NFPA 70-2020 Committee

Re: Public Comments for NFPA 70-2020

On behalf of the American Public Gas Association (APGA), we appreciate this opportunity to submit comments to the National Fire Protection Association on NFPA 70-2020. Our comments focus on the need to seal the annual space between a conductor and raceway/conduit and the space between the raceway/conduit and the structure's foundation wall.

APGA, the national association for municipally and community-owned natural gas utilities, is in a unique position to offer comments on this matter because of its members' proximity to the consuming public. APGA represents public gas systems and our members are non-profit retail distribution entities owned by, and accountable to, the citizens they serve. They include municipal gas distribution systems, public utility districts, county districts, and other public agencies that own and operate natural gas distribution facilities in their communities.

As described in the American Gas Association's (AGA) comments, our comments support the need to seal the annual space between a conductor and raceway/conduit and the space between the raceway/conduit and the structure's foundation wall. Underground conduits and raceways installed at the transition between two nonhazardous unclassified areas will substantially increase the spread of underground hazards into buildings when those conduits are not sealed. NFPA 70 does not require all underground conduit installations to be sealed and so it currently allows conduits to propagate hazards into buildings. AGA's proposal fixes that. These "internal seals" are inexpensive and should be used whenever any underground conduits enter a building, including used, unused, and spare conduits for branch services, feeders, and services. Such a seal will separate one nonhazardous unclassified area from another nonhazardous unclassified area. Our Public Comment is intended to support AGA's proposal to harmonize NFPA 70 with the requirements of the National Electric Safety Code (NESC) that apply to electric utilities.

AGA's amendment also mandates the installation of "external seals" at the joint between the conduit and the building when the point of entry is buried in the earth. Plumbing codes, gas codes, building codes, and the NESC require external seals to be installed around subgrade pipe and utility owned conduit penetrations into buildings for the protection of buildings and their

occupants from underground hazards that can be present at the points of entry, and NFPA 70 needs to provide the same protection and not less protection for conduit penetrations.

As the association for municipal and community-owned natural gas utilities, our focus is serving the citizens that own us. Requiring inexpensive seals around all below ground penetration will further protect residents from sewer gas, cable insulation pyrolysis, smoke as well as the loss of materials from fuel lines or tanks.

Sincerely,

A handwritten signature in black ink, appearing to read "Bert Kalisch". The signature is fluid and cursive, with the first name "Bert" and last name "Kalisch" clearly distinguishable.

Bert Kalisch
President & CEO

**Public Comment No. 1468-NFPA 70-2018 [Section No. 300.5(G)]****(G) Raceway Seals.**

Conduits or raceways through which moisture may contact live parts shall be sealed or plugged at either or both ends. Spare or unused raceways shall also be sealed. All conduits or raceways entering a building or structure shall be sealed at the end within the building or structure. Sealants shall be identified for use with the cable insulation, conductor insulation, bare conductor, shield, or other components. Explosionproof seals shall not be required for this purpose.

~~Informational Note: Presence of hazardous gases or vapors may also necessitate sealing of underground conduits or raceways entering buildings.~~

The outer surfaces of conduits or raceways shall be sealed around their perimeters where they enter a building or structure if the points of entry are in direct contact with the earth. Such sealants shall be identified for use with the conduits, raceways, and building materials that are in contact with the sealants.

Informational Note: No. 1 See 501.15 and 505.16 for sealing underground conduits or raceways that leave a Class I location.

Informational Note No. 2. Live parts are unlikely to be damaged by moisture if conduits or raceways are arranged to prevent moisture from contacting them.

Statement of Problem and Substantiation for Public Comment

Polywater agrees with the supporting statement in the Public Comment 444.

Related Item

- Public Input 3330-NFPA 70-2017

Submitter Information Verification

Submitter Full Name: Sherry Dahlke

Organization: American Pollywater Corp

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Submittal Date: Tue Aug 28 18:21:19 EDT 2018

Committee: NEC-P03

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Public Comment No. 444-NFPA 70-2018 [Section No. 300.5(G)]

(G) Raceway Seals.

Conduits or raceways through which moisture may contact live parts shall be sealed or plugged at either or both ends. Spare or unused raceways shall also be sealed. All conduits or raceways entering a building or structure shall be sealed at the end within the building or structure. Sealants shall be identified for use with the cable insulation, conductor insulation, bare conductor, shield, or other components.

~~Informational Note: Presence of hazardous gases or vapors may also necessitate sealing of underground conduits or raceways entering buildings.~~

Explosionproof seals shall not be required for this purpose. The outer surfaces of conduits or raceways shall be sealed around their perimeters where they enter a building or structure if the points of entry are below grade. Such sealants shall be identified for use with the conduits, raceways, and building materials that are in contact with the sealants.

Informational Note No. 1: See 501.15 and 505.16 for sealing underground conduits or raceways that leave a Class I location.

Informational Note No. 2: Live parts are unlikely to be damaged by moisture if conduits or raceways are arranged to prevent moisture from contacting them.

Statement of Problem and Substantiation for Public Comment

The American Gas Association, founded in 1918, represents more than 200 local energy companies that deliver clean natural gas throughout the United States. There are more than 74 million residential, commercial and industrial natural gas customers in the U.S., of which 95 percent — more than 70 million customers or 177 million Americans — receive their gas from AGA members. AGA members include most of the largest combination Electric and Natural Gas utilities in the U.S.

DISCUSSION PART A - INTERNAL SEALS.

A.1. Underground conduits and raceways installed at the transition between two nonhazardous unclassified areas will substantially increase the spread of underground hazards such as a leak from an underground natural gas pipe into buildings when those conduits are not sealed. NFPA 70 does not require all underground conduit installations to be sealed and so it currently allows conduits to propagate hazards into buildings. This proposal fixes that. The application of "internal seals" are warranted whenever any underground conduits enter a building, including used, unused, and spare conduits for branch services, feeders, and services. Such a seal will separate one nonhazardous unclassified area from another nonhazardous unclassified area. This Public Comment (PC) is intended to harmonize NFPA 70 with the requirements of the National Electric Safety Code (NESC) that apply to electric utilities - requirements that have existed since 1916. See, 2017 NESC Rules 322B4 and 355D; 1916 NESC Rule 295(j). Those NESC provisions serve the same purpose as those offered in this PC: to reduce the risk of injury or death to the building and its occupants against underground hazards that can be conveyed through conduits, including, sewer gas formed from the decay of residential and industrial wastes (including toxic and flammable gases), cable insulation pyrolysis (including toxic and flammable gases), smoke, the loss of containment from fuel lines or tanks (liquid, gas, and vapor), and any other recognized hazards that can be found within vaults or enclosures that are capable of being conveyed into a building through underground conduits (e.g., moisture and vermin). See, e.g., 29 CFR 1910.269(e)(10) (atmospheres of electrical vaults shall be tested for the presence of flammable gases and vapors before entry); 2017 NESC Rule 423B (same); 1916 NESC Rules 491 and 581 (same). The NESC and this PC acknowledge that there are external underground threats to buildings and occupants, and that conduits - which are uniquely effective at conveying underground hazards - should not substantially increase those threats. In this sense, seals/sealants are analogous to firestopping. See, 300.21 ("Electrical installations ... shall be made so that the possible spread of fire or products of combustion will not be substantially increased.") Both the NESC and this PC specify precautions commensurate with those external threats - the use of non-explosionproof seals.

A.2. The Code Making Panel's Resolution to PI-3330 seems to imply that the unplanned loss of containment from a natural gas distribution line necessitates the classification of the affected area as a Class I area. It does not. See, Schram, Benedetti, & Earley, Electrical Installations in Hazardous Area Classifications (NFPA), Third Edition (2009), 2-1 ("The simple presence or likelihood of the presence of a flammable or combustible material does not automatically classify an area as a hazardous location." (discussing leakage from an underground fuel gas pipe into a residence)). This PC uses the text from the sealing requirements in 225.27, 230.8, 300.7(A), and

501.15(B)(2) for seals that are not required to be explosionproof: re-enterable foam, jute, and other commercially available products and devices. These seals will be inexpensive for most dwellings and light commercial buildings. This proposal requires no study by any task group or foundation. Sealants have been used in equivalent installations by electric utilities for over a century. Indeed, when these seals are absent for one reason or another, preventable building evacuations and explosions with injuries have occurred - for decades. Current conduit sealing specifications from Consolidated Edison Company of New York, Inc. are being submitted to illustrate their practices.

A.3. One such preventable explosion occurred in a Phoenix apartment complex that grievously and permanently injured a pair of three-year old twin boys in 2003. That explosion was caused by the conveyance of natural gas from a ruptured 1-1/4" buried distribution pipe through 200 feet of 3" underground conduit and into a building's electrical panel. The building was more than 120 feet away from the resultant leak plume (i.e., the extent of underground natural gas migration in the earth), so the conduit was the only possible path of entry. That leak would not have injured anyone or anything and would have been uneventful but for the underground conduit. That conduit extended the hazard and nearly killed those boys. This proposal minimizes that risk.

DISCUSSION PART B - EXTERNAL SEALS.

B.1. This PC also mandates the installation of "external seals" at the joint between the conduit and the building when the point of entry is below grade. Plumbing codes, gas codes, building codes, and the NESC require external seals to be installed around subgrade pipe and utility owned conduit penetrations into buildings for the protection of buildings and their occupants from underground hazards that can be present at the points of entry, and NFPA 70 needs to provide the same protection and not less protection for conduit penetrations. See, 2018 NFPA 54 Nat'l Fuel Gas Code 7.1.5, 2018 Int'l Plumbing Code 315.1, 2018 Int'l Residential Code P2601.1, 2018 Uniform Plumbing Code 312.1, and 2017 NESC Rules 322B and 355D.

B.2. This PC is also needed because local building codes do not uniformly mandate this seal at conduits or raceways, and even if they did, this protection should be added to NFPA 70 because 1) these electrical installations substantially increase the spread of underground hazards in the absence of this seal and 2) the promulgation of standards intended to safeguard persons and property from hazards attendant to electrical installations should not be delegated to other various and varying building codes. See, 90.1(A) ("The purpose of this Code is the practical safeguarding of persons and property from hazards arising from the use of electricity.") Further, even if some building codes require this seal, those building codes are unlikely to have been adopted to the same extent as NFPA 70, which leaves buildings and their occupants unprotected.

B.3. The National Transportation and Safety Board concluded that a 1996 explosion in a San Juan, Puerto Rico, commercial building that killed 33 persons and injured at least 69 others was fueled by a crack in a 1-1/4" underground distribution propane pipe, and found that the leaked propane could have entered the building's basement around a subgrade conduit penetration through a masonry wall and/or through other competent entry paths before encountering several competent ignition sources. That electrical installation increased the spread of the hazard and may have killed those 33 people. This proposal minimizes that risk.

DISCUSSION PART C - INFORMATIONAL NOTE 1.

C. Informational Note 1, regarding the installation of seals when the conduit installation is in the "presence" of hazardous gases or vapors, must be revised (or eliminated) to avoid conflicts with this PC. Further, the current text is vague, ambiguous, and oversimplifies 501.15 and 505.16 for sealing conduits that leave a Class I boundary. The existing informational note connects requirements for installation in hazardous classification areas to this provision, and that connection needs to be eliminated. Also, the existing informational note gives inadequate direction for installing seals in conduits that leave soils that are classified as Class I hazardous areas. For example, the current text permits unsafe installations because it doesn't mandate the use of explosionproof sealing fittings for underground conduits leaving a Class I Division 1 hazardous area where required by 501.15 and 505.16, and it doesn't mandate the use of metal conduits or restrictions on the use of intermediate unions, couplings, or boxes for conduits leaving a Class I Division 2 hazardous area where required by 501.15 and 505.16. Such areas include soils with persistently high concentrations of methane, like well sites. See, e.g., City of Los Angeles Department of Building and Safety, Standard Plan: Methane Hazard Mitigation (rev. 2010), Table 9 on Sheet 5 of 8.

DISCUSSION PART D - INFORMATIONAL NOTE 2.

D. Informational Note 2, regarding the prevention of moisture damage to live parts through the ingenious use of gravity, is added because its information appears in 300.50(F) for high voltage installations, but is equally applicable to installations governed by 300.5(G).

SUPPORTING MATERIALS. Supporting materials sent to the NFPA for this Public Comment are available for download at bit.ly/2mwJucE

Supporting material being sent to the NFPA (for review by Code Making Panel only):

Referenced standards and publications; NTSB incident investigation report; exemplar electrical utility conduit sealing specifications; photographs and illustrations.

Related Item

• Public Input 3330-NFPA 70-2017 [Section No. 300.5(G)]

• Public Comment 445-NFPA 70-2018 [Section 300.50(F)]

Submitter Information Verification

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Submittal Date: Tue Aug 07 13:58:49 EDT 2018

Committee: NEC-P03

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Public Comment No. 745-NFPA 70-2018 [Section No. 300.5(G)]

(
G)

Raceway Seals.

Conduits or raceways through which moisture may contact live parts shall be sealed or plugged at either or both ends. Spare or unused conduits or raceways shall also be sealed. All conduits or raceways entering a building or structure shall be sealed at the end within the building or structure. Sealants shall be identified for use with the cable insulation, conductor insulation, bare conductor, shield, or other components. Explosionproof seals shall not be required for this purpose.

The outer surfaces of conduits or raceways shall be sealed around their perimeters where they enter a building or structure if the points of entry are in direct contact with the earth. Such sealants shall be identified for use with the conduits, raceways, and building materials that are in contact with the sealants.

Informational Note : Presence of hazardous gases or vapors may also necessitate sealing of underground conduits or raceways entering buildings. No. 1: See 501.15 and 505.16 for sealing underground conduits or raceways that leave a Class I location.

Informational Note No. 2: Live parts are unlikely to be damaged by moisture if conduits or raceways are arranged to prevent moisture from contacting them.

Statement of Problem and Substantiation for Public Comment

This comment is in support of the American Gas Association's attempt to require the sealing of underground penetrations through foundation walls. Although fuel gas leaks are not common, when they do happen the building is at risk if there are unprotected penetrations of the foundation wall. The proposed text will help protect against fuel gas migrating into the building through penetrations of electrical conduits or raceways.

Related Item

- • PC Nos. 444 and 445

Submitter Information Verification

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Submission Date: Thu Aug 16 16:53:29 EDT 2018

Committee: NEC-P03

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**Public Comment No. 489-NFPA 70-2018 [Section No. 300.9]****300.9 Raceways in Wet Locations Abovegrade.**

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

Raceways in wet locations, installed above grade in the interior, of buildings or other structures shall be arranged to drain and shall be listed or approved for use in wet locations.

Statement of Problem and Substantiation for Public Comment

I understand the panel wanting to leave the existing rules in 225.22 and 230.53 in there current locations, but still believe that raceways installed in wet locations on the inside of buildings and structures need to be arranged to drain. There is nothing in the current code language that requires these interior raceways to be arranged to drain.

Related Item

- Public Input No. 1380-NFPA 70-2017

Submitter Information Verification

Submitter Full Name: Don Ganiere

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Submittal Date: Wed Aug 08 22:39:10 EDT 2018

Committee: NEC-P03

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**Public Comment No. 574-NFPA 70-2018 [Section No. 300.9]****300.9 Raceways in Wet Locations Abovegrade.**

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

Statement of Problem and Substantiation for Public Comment

The first sentence needs to be deleted because the second sentence is fully functional without it.

A representative of a highly respected electrical products testing laboratory made the assertion that the interior of equipment that have an identification of "3" or "3R" is a dry location. However, the representative was unable to provide any documentation to support the assertion.

The first sentence creates unneeded confusion. Imagine all of the following equipment are mounted in a wet location. A raceway enters a panelboard cabinet that is marked "3R". Another raceway leaves the other side of the cabinet. We are to believe that the interior of the raceway on the left is "Wet", the interior of the cabinet is "Dry" and the interior of the raceway on the right is again "Wet". Yet, there is nothing in the NEC that requires sealing the raceways to prevent moisture from entering the panelboard cabinet.

The designation of the interior of the raceway is not needed so long as conductors that have the proper rating are used.

Related Item

- PI-178

Submitter Information Verification

Submitter Full Name: Phil Simmons

Organization: Simmons Electrical Services

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Submission Date: Sat Aug 11 23:54:14 EDT 2018

Committee: NEC-P03

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**Public Comment No. 519-NFPA 70-2018 [Section No. 300.11(B)(1)]****(1) Fire-Rated Assemblies.**

Wiring located within the cavity of a fire-rated floor–ceiling or roof–ceiling assembly shall not be secured to, or supported by, the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided and shall be permitted to be attached to the assembly. Where independent support wires are used, they shall be distinguishable by color, tagging, or other effective means from those that are part of the fire-rated design.

Exception: The ceiling support system shall be permitted to support wiring and equipment that have been tested as part of the fire-rated assembly.

Informational Note: One method of determining fire rating is testing in accordance with ANSI/ASTM E119-16a 18a , *Standard Test Methods for Fire Tests of Building Construction and Materials*.

Statement of Problem and Substantiation for Public Comment

date update

Related Item

- FR8727

Submitter Information Verification

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Organization: GBH International

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Submission Date: Thu Aug 09 18:47:59 EDT 2018

Committee: NEC-P03

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Public Comment No. 953-NFPA 70-2018 [Section No. 300.11(B) [Excluding any Sub-Sections]]

Support wires that do not provide secure support shall not be permitted as the sole support. Support wires and associated fittings that provide secure support and that are installed in addition to the ceiling grid support wires shall be permitted as the sole support. Where independent support wires are used, they shall be secured at both ends. Grid wires for the support of electrical wiring shall be 12 gauge or greater and be made for the purpose as a grid support wire. Cables and raceways shall not be supported by ceiling grids.

Statement of Problem and Substantiation for Public Comment

This added sentence ensures residential grade grid wire, bailing wire, etc., from being installed. Beside the strength of lesser than 12 gauge wire, clips made for the support of electrical cables, conduits, and boxes are made for heavier gauge wire.

Related Item

- 300.11B

Submitter Information Verification

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Organization: State of Colorado

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State:

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Submittal Date: Mon Aug 20 18:22:09 EDT 2018

Committee: NEC-P03

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Public Comment No. 955-NFPA 70-2018 [Section No. 300.15(C)]

(C) Protection.

A box or conduit body shall not be required where cables enter or exit from conduit or tubing that is used to provide cable support or protection against physical damage. A fitting shall be provided on the end(s) of the conduit or tubing to protect the cable from abrasion.

Exception: A fitting shall not be required where conductors exit a raceway within the pole of a pole-supported luminaire.

Statement of Problem and Substantiation for Public Comment

Often, underground conduits are sized up from what is required for ease pulling lengthy conductors. Conductors and conduits may also be sized up for increased conductor size, considering voltage drop. Grouping more than 2 conduits to enter the bottom of a light pole fixture can make it physically difficult to fit fittings adjacent to each other. I don't think this fitting is necessary for pulling or after-installation reasons. The conductors would be pulled in a direct direction when working through the handhole cover, causing no damage to conductors. The conductors, in their stagnant after installation position, exit the conduits in a direct direction, causing no damage to the conductors.

The blue text of 2014 NEC Handbook mentions a fitting is required for raceways 'on poles'. It doesn't mention 'within a light pole'.

300.4G does not provide an exception for bushings required on PVC type or non-metallic conduit. I believe this is the right call not just because of the 'heavier' conductors, as mentioned in the NEC Handbook, but because of the position of the conductors may be placed in, within an enclosure where the insulation can be gouged into by the fitting; metallic or non-metallic. This is not the case for the confines of a light pole.

The likeliest way I see damage occurring would be if the installer(s) pulled the conductors into the conduit without the light pole in place and pulled at an angle other than directly out faced direction of the conduit. Damaging the conductors this way would be clearly evident while pulling the conductors, and would bring into question the qualifications of those installers.

I didn't see that 410 Part IV makes an added mention that luminaire poles are required to be a listed product. Therefore, I didn't mention that in the proposal. 110.2 makes it possible for an inspector to look for a listing already.

Related Item

- 300.15C Exception

Submitter Information Verification

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Submittal Date: Mon Aug 20 18:32:07 EDT 2018

Committee: NEC-P03

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**Public Comment No. 1121-NFPA 70-2018 [Section No. 300.15(F)]****(F) Fitting.**

A fitting identified for the use shall be permitted in lieu of a box or conduit body where conductors are not spliced or terminated within the fitting. The fitting shall be accessible after installation, unless listed for concealed installation- ~~or listed interconnector devices as provided in 344.40(B).~~

Statement of Problem and Substantiation for Public Comment

It appears that during the reconstruction of this sub section the panel may have created another conflict by including the reference to interconnector devices governed by section 344.40(B) titled "Devices of Insulating Material". Interconnector devices do not appear to comply with the definition of a "fitting". Furthermore if these devices are to be considered "a fitting" it will not agree with CMP 1's work on FR 8342 regarding the edited definition of a Fitting which will read as follows; "Fitting: A means for connecting raceway, cable, or cord to an enclosure, box, or raceway system. (CMP-1)". Interconnector devices connect cable to cable (a splice) without the use of an enclosure. Interconnector devices are not fittings (as stated in the new definition) they are splicing devices which are designed to interconnect Type NM Cables (see the scope of UL 2256). It is important to note that these interconnectors are listed in accordance with UL Standard 2256 under product category QAAV, whereas typically conduit and cable fittings (change overs) are listed to UL Standard 514 B and referenced under product category DWTT.

Related Item

- FR8696

Submitter Information Verification

Submitter Full Name: Charles Palmieri

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Submission Date: Thu Aug 23 10:25:24 EDT 2018

Committee: NEC-P03

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**Public Comment No. 1334-NFPA 70-2018 [Section No. 300.15(F)]****(F) Fitting.**

A fitting identified for the use shall be permitted in lieu of a box or conduit body where conductors are not spliced or terminated within the fitting. The fitting shall be accessible after installation, unless listed for concealed installation or listed interconnector devices as provided in 344 334 .40(B).

Statement of Problem and Substantiation for Public Comment

A typo was made as section 344.40(B) does not exist and the content of the text is referring to section 334.40(B).

Related Item

- FR 8696

Submitter Information Verification

Submitter Full Name: Vince Baclawski

Organization: Nema

Street Address:

City:

State:

Zip:

Submittal Date: Mon Aug 27 10:46:32 EDT 2018

Committee: NEC-P03

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**Public Comment No. 1517-NFPA 70-2018 [Section No. 300.15(F)]****(F) Fitting.**

A fitting identified for the use shall be permitted in lieu of a box or conduit body where conductors are not spliced or terminated within the fitting. ~~The fitting.~~ Fittings designed as a pull point, outlet point or splice point shall be accessible after installation, ~~unless listed for concealed installation or listed interconnector devices as provided in 344.40(B).~~

Statement of Problem and Substantiation for Public Comment

The first revision mandates that the fitting only has to be accessible if " listed for concealment". UL 514B does not list fittings for concealment. Fittings such as couplings and connectors that are buried in walls on most installations are not "listed for concealment". Please remove that overly restrictive language that will make the input worthless. Thank you for your consideration

Related Item

- FR 8696, PI 1890, 1377, 1925 & 4150

Submitter Information Verification

Submitter Full Name: James Dorsey

Organization: Douglas County Electrical Insp

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State:

Zip:

Submission Date: Wed Aug 29 09:59:24 EDT 2018

Committee: NEC-P03

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**Public Comment No. 386-NFPA 70-2018 [Section No. 300.15(F)]****(F) Fitting.**

A fitting identified for the use shall be permitted in lieu of a box or conduit body where conductors are not spliced or terminated within the fitting. The fitting shall be accessible after installation, unless listed for concealed installation or listed interconnector devices as provided in 344 334 .40(B).

Statement of Problem and Substantiation for Public Comment

Change reference to 334.40(B) from 344.40(B). Typo

Related Item

- FR-8696

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc

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City:

State:

Zip:

Submittal Date: Sat Aug 04 15:27:34 EDT 2018

Committee: NEC-P03

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**Public Comment No. 491-NFPA 70-2018 [Section No. 300.15(F)]****(F) Fitting.**

A fitting identified for the use shall be permitted in lieu of a box or conduit body where conductors are not spliced or terminated within the fitting. ~~The fitting shall be accessible after installation, unless listed for concealed installation or listed interconnector devices as provided in 344.40(B).~~ _

Statement of Problem and Substantiation for Public Comment

While I recognize the reasoning behind ensuring that a fitting be used as it is designed, tested and listed, I feel that the verbiage requiring and a fitting be listed for concealed use adds an unnecessary requirement. I see these fittings as being used in the exact same fashion as a coupling for any raceway, the only difference is that they are connecting two different types of raceways. Couplings for EMT, GRC and other raceways are not subject to the requirement of being listed for concealed use.

Related Item

- PI-1925

Submitter Information Verification

Submitter Full Name: Kevin Rohr

Organization: Greiner Electric

Street Address:

City:

State:

Zip:

Submittal Date: Thu Aug 09 10:44:14 EDT 2018

Committee: NEC-P03

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**Public Comment No. 546-NFPA 70-2018 [Section No. 300.15(F)]****(F) Fitting.**

A fitting identified for the use shall be permitted in lieu of a box or conduit body where conductors are not spliced or terminated within the fitting. The fitting shall be accessible after installation, unless listed for concealed installation or listed interconnector devices as provided in 344 ~~334~~ .40(B).

Statement of Problem and Substantiation for Public Comment

The correct Code reference here for interconnector devices is 334.40(B) [not 344.40(B)]. There is no 344.40(B) in Article 344.

Related Item

- FR 8696 • 300.15(F)

Submitter Information Verification

Submitter Full Name: L. Keith Lofland

Organization: IAEI

Affiliation: Self

Street Address:

City:

State:

Zip:

Submittal Date: Fri Aug 10 17:33:25 EDT 2018

Committee: NEC-P03

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Public Comment No. 229-NFPA 70-2018 [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.

Exception: Where transitions are made from one type of wiring method to another type of wiring method, fittings and connectors shall not be required to be listed for both wiring methods, but shall be approved.

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, or conductor splice point, junction point, termination point, or pull point, unless otherwise permitted in 300.15(A) through (L).

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
300.15.JPG	Example of raceway fitting commonly thought to be required to comply accessibility requirements in with 300.15(F) due to misapplication of the words "termination point" being applied to the raceway termination instead of "conductor termination" as originally intended.	
Transition_2.JPG	example of an "approved" transition between different wiring methods where more than one fitting was used.	
300.15F.JPG	A fitting with a removable back, that could be used as a CONDUCTOR pull point. This type of fitting would need to comply with 300.15(F)	

Statement of Problem and Substantiation for Public Comment

This is a revision to submitted Public Input #2983.

This revised exception is needed to solve the age-old problem of changing wiring methods when there is no such fitting that is specifically listed for both types of wiring methods. A classic example of this could be installing PVC conduit underground, but changing to RMC where the conduit run emerges from grade as permitted in sections 514.8 exception 2. Another example might be installing isolated metal elbows in an underground run of nonmetallic conduit as specified in sections 250.80 exception or 250.86 exception 3. Transitioning from PVC to RMC is a very common practice by simply threading a female PVC connector onto the end of the RMC. The PVC connector may be listed for use with PVC, but not RMC. And vice-versa, RMC fittings are not listed for use with PVC, yet this type of transition practice is very common. What about transitioning from a raceway such as a Wireway (which, according to 376.2 is in fact a raceway) to LFMC???? is there a fitting specifically listed for use with both wiring methods ????? I tend to think not. Yet, connecting EMT or RMC, or even NM cables to a Wireway is permitted per section 376.70. Are there any fittings specifically listed for this type of wiring method transition? I doubt it. There are too many other possible transition combinations to specify here. Finding a fitting that is listed for every possible combination of both type and size of wiring method is virtually impossible! This revision will allow the AHJ to determine whether the transition from PVC to RMC, or from RTRC to LFNC, or from EMT to FMC, or from PVC to LFNC, or from EMT to LFMC, or even from EMT to a Wireway , etc. etc. etc. is safe or not.

The revised wording in the 3rd. paragraph is needed to clarify that "termination point" is referring to a CONDUCTOR termination point rather than RACEWAY termination points. Many installers and inspectors alike are requiring transition fittings such as an EMT to FMC changeover fitting to be accessible because the original intent of this rule is not known or has been forgotten. Prior to 2002 the words "termination point" did not exist in this section. It was never intended to apply to raceway terminations or raceway junctions. It was always intended to apply to CONDUCTOR terminations, conductor splices, conductor pull points and conductor junctions. Yet it is often misapplied. Many other Public Inputs have been submitted in similar fashion to section 300.15(F) to address this problem. But I think a revision to the main body of 300.15 is required to clarify when 300.15(F) would even be applicable. A few more examples.... An EMT coupling is a raceway junction point, but it is NOT a Conductor junction point, therefore a box is not required, and therefore 300.15(F) is also not applicable. And likewise, an EMT to FMC changeover connector is a raceway junction point, but it is NOT a conductor junction point, conductor splice point, or conductor termination point and a box is not required, which means the fitting is merely a type of "coupling" and not being used "in lieu of a box" therefore 300.15(F) is also not applicable. An underground run of

PVC is often changed to RMC where it emerges from grade. This underground location where the PVC connects to the RMC is a raceway junction point, but it is not a CONDUCTOR junction point. A box is certainly not required at this point, and 300.15(F) was also never meant to apply here. A UF cable sleeved in a PVC conduit where the UF emerges from ground is a similar example where a box is not required underground where the UF enters the PVC conduit and thus, the 3rd. paragraph of 300.15 was never meant to apply at this raceway termination either. The 3rd. paragraph of 300.15 was meant to cover installations where single insulated conductors would otherwise exist at outlets, switch points, conductor splice points, conductor junction points, conductor termination points, or conductor pull points. These are locations where a box would be required...unless otherwise permitted in 300.15(A) through (L). It seems as though the original intent of this section has unfortunately been forgotten.

Here is the wording from the original Proposal for the 2002 NEC...

(Log #3012)

3- 83 - (300-15(a)): Accept in Principle

SUBMITTER: Robert H. Keis, Dover, DE

RECOMMENDATION: Insert the words "termination point" into the required locations or points where a box is required.

300-15. Boxes, Conduit Bodies, or Fittings—Where Required.

(a) Box or Conduit Body. Where the wiring method is conduit, electrical metallic tubing, Type AC cable, Type MC cable, Type MI cable, nonmetallic-sheathed cable, or other cables, a box or conduit body complying with Article 370 shall be installed at each conductor splice point, outlet, switch point, junction point, termination point, or pull point, unless otherwise permitted in (b) through (n). A box shall be installed at each outlet and switch point for concealed knob-and-tube wiring.

SUBSTANTIATION: The argument has come up recently about just taping the ends of an abandoned, but usable cable and leaving the cable end buried in a wall or laying in a ceiling.

Nowhere in the code can I find a requirement that abandoned cables need to be removed and a lot of times that would be needless expense. Often cables are discontinued for one reason or another and may or could be utilized again in the future. This will settle a long standing argument. We tell the electrician when he violates the code to "read the words." He did just that, and that is reason for this proposal. The words aren't there!

PANEL ACTION: Accept in Principle.

PANEL STATEMENT: See panel action on Proposal 3-81.

However, truly abandoned wires should not remain energized or connected to a possible source of potential.

NUMBER OF PANEL MEMBERS ELIGIBLE TO VOTE: 11

VOTE ON PANEL ACTION:

AFFIRMATIVE: 11

I am acutely familiar with this issue since it was my conversation with Robert that caused him to submit this proposal. Since 2002, taping the ends of the conductors of an abandoned but live, NM cable are considered conductor terminations and would generally require a box. The revised wording will help clarify the intent. This revision will also help clarify the applicability or non-applicability of 300.15(F) in conjunction with FR8696. It makes it clear that a "changeover" connector is not being used in lieu of a box or required to be accessible in accordance with 300.15(F) since it is not a conductor pull point, conductor termination point, or conductor splice point. An example of a fitting that would need to comply with 300.15(F) is a 90 degree FMC connector where the back of the connector can be removed so it can be used as a CONDUCTOR pull point. I have provided a photo example of that type of fitting too.

Related Item

- PI 2983

Submitter Information Verification

Submitter Full Name: Russ Leblanc

Organization: Leblanc Consulting Services

Street Address:

City:

State:

Zip:**Submittal Date:** Wed Jul 18 08:22:31 EDT 2018**Committee:** NEC-P03**Copyright Assignment**

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**Public Comment No. 508-NFPA 70-2018 [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 serving ~~electrical~~ equipment permitted by the AHJ in the exit enclosure shall be installed within the exit enclosure.

Informational Note: For more information, refer to NFPA 101-2018, *Life Safety Code*, 7.1.3.2.1(10)(b).

Statement of Problem and Substantiation for Public Comment

The word "electrical" is unnecessary and repetitive and would potentially limit the application of the requirement.

Related Item

- FR8742

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler

Organization: GBH International

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Submittal Date: Thu Aug 09 16:14:59 EDT 2018

Committee: NEC-P03

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**Public Comment No. 653-NFPA 70-2018 [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 electrical equipment permitted by the AHJ in the exit enclosure shall be installed within the exit enclosure.

Informational Note: For more information, refer to NFPA 101-2018, *Life Safety Code*, 7.1.3.2.1(10)(b).

Statement of Problem and Substantiation for Public Comment

"methods" was added after "wiring". Wiring methods is used throughout the code and includes more than just wire or conductors.

Related Item

- FR 8742

Submitter Information Verification

Submitter Full Name: David Kendall

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Submittal Date: Tue Aug 14 15:31:36 EDT 2018

Committee: NEC-P03

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Public Comment No. 719-NFPA 70-2018 [Section No. 300.37]

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, insulated bus pipe (IBP), 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.

Statement of Problem and Substantiation for Public Comment

PI 1882 and PI 1883 were originally submitted to CMP-3 to have Insulated Bus Pipe (IBP) added to 300.37 as an acceptable wiring method to be used in exposed runs in locations accessible to qualified persons only. Since bare conductors, including bare bus bars, are also allowed in these applications, it stands to reason that similar wiring methods would pose no greater hazard than a bare conductor.

Subsequent to submitting the above PIs, the submitter realized that it might be appropriate to create an entire Article covering IBP. A proposed new Article was presented at the first draft meeting, along with a presentation introducing IBP.

Subsequent discussion at the CMP-3 meeting focused on the fact that there was no standard for IBP at that time. Since the first draft meeting, UL has developed an outline of investigation, UL 1366, covering Insulated Bus Pipe, which can now be used to List IBP.

The proposals were resolved with the following panel statement:

“The product standard is not currently available for review. Insulated Bus Pipe (IBP) is not a wiring method specifically covered in Chapter 3, so there aren’t any installation requirements in the NEC. These systems may be common in Europe, ships, and utility applications, but not covered by the NEC. If IBP were to be addressed by the NEC, it should be done so in a new article...” The statement continues with an example of such an Article, with the example being essentially what was proposed by the original submitter during the presentation at the first draft meeting.

The concerns of the panel regarding availability of a standard have been resolved. With respect to the panel’s suggestion that a new Article covering IBP should be included in Chapter 3, A new Article that duplicates the wording published in the panel statement is proposed as Public Comment No. XXXX. With the publication of that information in the Meeting Report, it is available as part of the public record; therefore, this information should not be considered new material.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 729-NFPA 70-2018 [Global Input]	New Article for Insulated Bus Pipe
Public Comment No. 729-NFPA 70-2018 [Global Input]	
Public Comment No. 732-NFPA 70-2018 [Annex A]	

Related Item

- PI 1882 • PI 1883

Submitter Information Verification

Submitter Full Name: Robert Osborne

Organization: UL LLC

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Zip:

Submit Date:

Committee:

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**Public Comment No. 1470-NFPA 70-2018 [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.~~

Seals.

See 300.5(G).

Statement of Problem and Substantiation for Public Comment

Polywater agrees with the supporting statement in the Public Comment 445.

Related Item

- Public Input 3332-NFPA 70-2017

Submitter Information Verification

Submitter Full Name: Sherry Dahlke

Organization: American Polywater Corp

Street Address:

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Zip:

Submittal Date: Tue Aug 28 18:32:09 EDT 2018

Committee: NEC-P03

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**Public Comment No. 445-NFPA 70-2018 [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.~~

Seals.

See 300.5(G)

Statement of Problem and Substantiation for Public Comment

The American Gas Association, founded in 1918, represents more than 200 local energy companies that deliver clean natural gas throughout the United States. There are more than 74 million residential, commercial and industrial natural gas customers in the U.S., of which 95 percent — more than 70 million customers or 177 million Americans — receive their gas from AGA members. AGA members include most of the largest combination Electric and Natural Gas utilities in the U.S.

The current text of Section 350.50(F) for high voltage underground conduit installations will be far less comprehensive than the text of 300.5(G) for the general requirements of underground conduit installations if our related Public Comment to section 300.5(G) is accepted, and so this Public Comment strikes all the text in 300.50(F) and replaces it with a reference to 300.5(G).

Also, we are concerned that the phrase "...or it shall be so arranged to prevent moisture from contacting live parts" may permit the installer to avoid the use of seals if steps are taken that only address moisture. Other underground hazards could circumvent such protections, including sewer gas formed from the decay of residential and industrial wastes (including toxic and flammable gases), cable insulation pyrolysis (including toxic and flammable gases), smoke, the loss of containment from fuel lines or tanks (including where fuel gases and vapors are lighter than air), and any hazards that can found within vaults or enclosures capable of being conveyed into a building through underground conduits by means other than gravity (e.g., vermin).

Please see Public Comment 444 regarding 300.5(G) for a response to remaining comments made in the Code Making Panel's resolution of PI-3332.

Related Item

• Public Input 3332-NFPA 70-2017 [Section No. 300.50(F)] • Public Comment No. 444-NFPA 70-2018

Submitter Information Verification

Submitter Full Name: Paul Cabot

Organization: American Gas Association

Street Address:

City:

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Zip:

Submittal Date: Tue Aug 07 14:14:23 EDT 2018

Committee: NEC-P03

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Public Comment No. 1117-NFPA 70-2018 [Section No. 590.4(G)]

(G) Splices.

A box, conduit body, or other enclosure, with a cover installed, shall be required for all splices.

Exception No. 1: On construction sites, a box, conduit body, or other enclosure shall not be required for either of the following conditions:

- (1) *The circuit conductors being spliced are all from nonmetallic multiconductor cord or cable assemblies, provided that the equipment grounding continuity is maintained with or without the box.*
- (2) *The circuit conductors being spliced are all from metal-sheathed cable assemblies terminated in listed fittings that mechanically secure the cable sheath to maintain effective electrical continuity.*

Exception No. 2:

~~On~~

On construction sites, where

branch circuits installed as

permanent wiring in framed walls and ceilings

are

is GFCI protected and used to supply temporary power or lighting

~~, a~~

~~:~~

(1)

A cover shall not be required for splices installed completely inside of junction boxes with plaster rings.

(2)

Listed pigtail-type lampholders shall be permitted to be installed in ceiling-mounted junction boxes with plaster rings.

(3)

Finger safe devices for supplying and connection to devices shall also be permitted.

-

Statement of Problem and Substantiation for Public Comment

This new exception needs to go one step further to insure a safe work site. It is un-debatable that during the many stages of construction all exposed energized conductors are subject to inadvertent contact by individuals. Clearly workers who fabricate and finish walls and ceilings will handle metallic framing members and or use metallic tools with semi-sharp edges. It has been previously documented that fatalities can occur. The use of finishing tools combined with the necessity of using metal staging or ladders puts workers at risk of shock or electrocution. If these branch circuits are provided with GFCI protection during the time of construction where pigtail lampholders (exposed or open conductors) may be suspended from a permanent outlet enclosure (without a cover) I am confident that personnel protection would be greatly enhanced. NOTE: During the 1996 renewal cycle a fatal accident occurred in Harrisburg Pennsylvania where a worker on scaffolding was killed. While removing a metal stud the stud came in damaged a energized (open) conductor and electrocuted the individual. See NFPA-70 A-95 ROP Log # 3034, 3-145, and Log # 3035 3-46 to then section 305-4(c).

Related Item

- none

Submitter Information Verification

Submitter Full Name: Charles Palmieri

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Zip:**Submittal Date:** Thu Aug 23 09:45:55 EDT 2018**Committee:** NEC-P03**Copyright Assignment**

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Public Comment No. 1495-NFPA 70-2018 [Section No. 590.4(G)]

(G) Splices.

A box, conduit body, or other enclosure, with a cover installed, shall be required for all splices.

Exception No. 1: On construction sites, a box, conduit body, or other enclosure shall not be required for either of the following conditions:

- (1) *The circuit conductors being spliced are all from nonmetallic multiconductor cord or cable assemblies, provided that the equipment grounding continuity is maintained with or without the box.*
- (2) *The circuit conductors being spliced are all from metal-sheathed cable assemblies terminated in listed fittings that mechanically secure the cable sheath to maintain effective electrical continuity.*

Exception No. 2: On construction sites, where ~~branch circuits installed as~~ permanent wiring in framed walls and ceilings ~~are~~ is ground fault circuit interrupter protected and used to supply temporary power or lighting, ~~a~~ any of the following are permitted:

- 1. A cover shall not be required for splices installed completely inside of junction boxes with plaster rings.*
- 2. Listed pigtail-type lampholders ~~shall be permitted to be~~ installed in ceiling-mounted junction boxes with plaster rings.*
- 3. Finger safe devices for supplying and connection to of devices ~~shall also be permitted~~.*

Statement of Problem and Substantiation for Public Comment

This new exception needs to go one step further to insure a safe work site. It is un-debatable that during the many stages of construction all exposed energized conductors are subject to inadvertent contact by individuals. Clearly workers who fabricate and finish walls and ceilings will handle metallic framing members and or use metallic tools with semi-sharp edges. It has been previously documented that fatalities can occur. The use of finishing tools during combined with the necessity of using metal staging or ladders puts workers at risk of shock or electrocution. If these branch circuits are provided with GFCI protection during the time of construction where pigtail lampholders (exposed or open conductors) may be suspended from a permanent outlet enclosure (without a cover) I am confident that personnel protection would be greatly enhanced. NOTE: During the 1996 renewal cycle a fatal accident occurred in Harrisburg Pennsylvania where a worker on scaffolding was killed. While removing a metal stud the stud came in damaged a energized (open) conductor and electrocuted the individual. See NFPA-70 A-95 ROP Log # 3034, 3-145, and Log # 3035 3-46 to then section 305-4(c).

Related Item

- FR 8770

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Committee: NEC-P03

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**Public Comment No. 170-NFPA 70-2018 [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, 2011.

Statement of Problem and Substantiation for Public Comment

In article 590.6(A)(3) the requirement for GFCI protection for only receptacles on portable generators rated at 15 kW or less should be removed. GFCI protection should be required for all 125 and 125/250 volt single phase 15, 20 and 30 ampere receptacles regardless of the size of the generator period. Many construction and maintenance locations use portable generators larger than 15 kW but the branch circuit receptacles are not GFCI protected and according to the current article 590.6(A)(3) they are not required to be GFCI protected.

The employee is exposed to the exact same shock hazard when using temporary power from any portable generator.

By removing "15kW or less" and "15kW or smaller" from the article will ensure employees will be GFCI protected whenever they use electrical power from a portable generator.

Portable "pig tail" GFCI devices offer the same protection to employees using power from a 10 kW generator or a 30 kW generator.

Related Item

- First draft stage

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Submission Date: Thu Jul 05 16:49:46 EDT 2018

Committee: NEC-P03

Copyright Assignment

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Public Comment No. 744-NFPA 70-2018 [Section No. 590.6(A)(3)]

(3) Receptacles on 15-kW or less ~~Portable~~ Smaller Portable Generators.

Portable generators used to provide temporary power shall have a bonded neutral. 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~~ smaller portable generators manufactured or remanufactured prior to January 1, 2011.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
445-20_GFCI_Unbonded.jpg	GFCIs supplied by Generators that have a floating neutral	
445-20_GFCI_Unbonded-2.jpg	GFCIs in Listed Cord Set Supplied by Generator Having an Unbonded Neutral	

Statement of Problem and Substantiation for Public Comment

Both "less" and "Smaller" are used in the description of the portable generator in the title and text. It seems "Smaller" is correct because it describes a size whereas "less" describes a quantity.

It is critically important that this section that deals with personnel safety while doing construction activities require that portable generators be of the bonded neutral variety, Manufacturers produce both varieties.

As shown in the drawing supplied, a GFCI cannot function if the neutral is floating because there is no circuit for ground-fault or leakage current to return to its source. In addition, the UL Safety Standard for GFCIs UL-943, has the following information in Guide Card KCXS, "GFCIs are intended to be used only in circuits where one of the conductors is solidly grounded." In addition to not providing GFCI protection, it is a violation of 110.3(B) to use GFCIs on generators that have an unbonded neutral.

The same hazard exists if a Listed or unlisted flexible cord is used to provide GFCI protection when the portable generator has an unbonded neutral. As shown in the drawing submitted, a complete circuit does not exist if the neutral is unbonded. This is true even though the flexible GFCI cord is supplied from a grounding-type receptacle. Finally, this Comment does not introduce a concept that has not seen the light of day. The requirement that Class A GFCIs be supplied from a grounded (bonded) electrical system is as old as the development of this safety device itself.

Related Item

- PI-7

Submitter Information Verification

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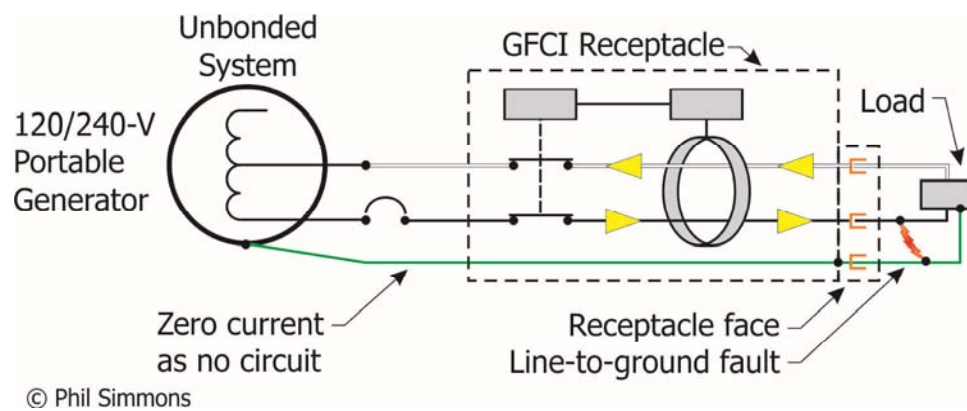
Submittal Date: Thu Aug 16 16:43:44 EDT 2018

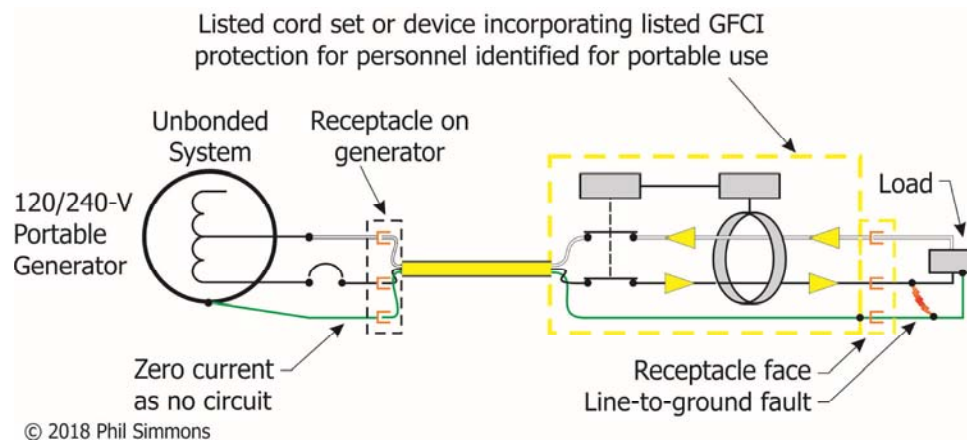
Committee: NEC-P03

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Public Comment No. 1359-NFPA 70-2018 [Section No. 590.6(B)(2)]

~~(2)~~

Infomational Note: Discription of An Assured Equipment Grounding Conductor Program

A written assured equipment grounding conductor program continuously enforced at the site by one or more designated persons to ensure that equipment grounding conductors

for

all

cord

sets, receptacles that are not a part of the permanent wiring of the building or structure,

and

equipment connected by cord and

plug

are installed and maintained in accordance with the applicable requirements of 250.114 , 250.138 , 406.4(C) , and 590.4(D) .

- The following tests shall be performed on all cord sets, receptacles that are not part of the permanent wiring of the building or structure, and cord and plug-connected equipment required to be connected to an equipment grounding conductor:
 - (1) All equipment grounding conductors shall be tested for continuity and shall be electrically continuous.
 - (2) Each receptacle and attachment plug shall be tested for correct attachment of the equipment grounding conductor. The equipment grounding conductor shall be connected to its proper terminal.
 - (3) All required tests shall be performed as follows:
 - (4) Before first use on site
 - (5) When there is evidence of damage
 - (6) Before equipment is returned to service following any repairs
 - (7) At intervals not exceeding 3 months

The tests required in item 590.6(B)(2) (a) shall be recorded and made available to the authority having jurisdiction

connected portable equipment not protected by GFCI(s) can be found in NFPA 70E .

Statement of Problem and Substantiation for Public Comment

It is clear that the scope of the NEC covers (installation and removal), not safe work practices and procedures. Safe work practices and procedures are covered by NFPA 70E, not the NEC. They are within the scope of NFPA 70E. The description of an Assured Equipment Grounding Conductor Program (practice or procedure) belongs in NFPA 70E. The submitter has submitted a PI to NFPA 70E to accomplish this. The scope of the two documents should not be confused by including a procedure in the NEC.

Related Item

- PI-3839

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Mon Aug 27 13:28:23 EDT 2018

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Public Comment No. 1593-NFPA 70-2018 [Section No. 590.6 [Excluding any Sub-Sections]]

Ground In addition to the requirements in 210.8, ground -fault protection for personnel for all temporary wiring installations shall be provided to comply with 590.6(A) and (B). This section shall apply only to temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities. This section shall apply to power derived from an electric utility company or from an on-site-generated power source.

Statement of Problem and Substantiation for Public Comment

This Public Comment is the work of an NEC Correlating Committee task group directed to develop standardized text to improve correlation, clarity and usability of the NEC. This effort identified GFCI requirements that supplement or modify the general requirements of 210.8. The present GFCI requirements throughout the NEC were developed by various Technical Committees when the general GFCI requirements in 210.8 were limited to dwelling units. The consequences of time and various committees working to enhance safety have created significant correlation issues with the general requirements in 210.8. The arrangement of the NEC, as detailed in 90.3 clarifies that the general requirements of Chapters 1 through 4 apply "generally to all electrical installations." The work of this Task Group resulted in 41 public comments to provide necessary correlation, clarity and usability. The task group's work was identified in and based upon Correlating Committee Note 152 to the 2020 First Revisions. The Task Group members consisted of Jim Dollard, Chair, Steve Campolo, Donny Cook, Tom Domitrovich, Mark Hilbert, Keith Lofland, Alan Manche and Steve Rood.

Related Item

- CCN 152

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Submittal Date: Wed Aug 29 12:41:52 EDT 2018

Committee: NEC-P03

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Public Comment No. 1619-NFPA 70-2018 [New Section after 590.7]

590.8 Overcurrent Protective Devices.

(A) Re-used. Where overcurrent protective devices that have been previously used are installed in a temporary installation, they shall be examined to ensure they have been properly installed, properly maintained, and there is no evidence of impending failure.

(B) Service Overcurrent Protective Devices. Overcurrent protective devices for solidly grounded wye electric services of more than 150 volts to ground but not exceeding 1000 volts phase-to-phase 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. 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/standards include but are not limited to NEMA AB-4 "Guidelines for Inspection and Preventative Maintenance of Molded Case Circuit Breakers Used in Commercial and Industrial Applications", NFPA 70B "Recommended Practice for Electrical Equipment Maintenance", NEMA GD-1 "Evaluating Water-Damaged Electrical Equipment", and IEEE 1458 "The Recommended Practice for the Selection, Field Testing, and Life Expectancy of Molded Case Circuit Breakers for Industrial Applications"

Statement of Problem and Substantiation for Public Comment

PI 3276 was submitted during 1st draft to address re-use of equipment in temporary installations.

The input also included requirements for:

ALL overcurrent devices rated at or below 1000 volts and above 400 amperes to be current limiting and ALL service overcurrent devices rated at or below 1000 volts to be current limiting.

The proposed input was resolved with a comment indicating the AHJ has the responsibility for approving equipment. Where new listed equipment is installed, approval is not an issue and most AHJ's would accept that responsibility without question. However, when equipment is re-used, and that equipment has been subjected to environments, uses, and conditions that may not be visibly obvious, approval of that equipment is difficult in many cases. The equipment may be listed, but could very well have been used or exposed to conditions outside the scope of the certification. Most certification includes limitations and this concept simply raises awareness that a product (the protection product) should not simply have a listing mark, but also remain functional. This comment is in support of the original text for re-used equipment and that substantiation.

While the text proposed for current limitation was certainly sweeping and covered service overcurrent devices that could have been installed on extremely low energy systems, this comment seeks to salvage the current limitation for installations likely to be exposed to high energy installations at levels where added protection is needed. As stated in the substantiation to PI 3276, many temporary services are located very near utility transformers. Based on proposed text in this comment, the current limitation is focused on installations with significant energy, very limited impedance in the service circuit, frequent need to examine the the equipment for proper voltage associated with temporary installations.

The obvious purpose for Article 590 is to permit a less restrictive, but safe installation.

Related Item

- PI-3276 •

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Signature Date:

Committee:

Wed Aug 29 13:25:07 EDT 2018

NEC-P03

**Public Comment No. 1307-NFPA 70-2018 [Section No. 720.2]****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 and III of Article 760, shall not be required to comply with this article.

Statement of Problem and Substantiation for Public Comment

PI 3194 suggested adding "Control and signaling circuits are not covered by this article" in the scope statement. The panel resolution states "Control and signaling circuits are not covered by the requirements of 720. See section 720.2 that excludes articles 725 and 760.

720.2, however only excepts 725 Parts I and III.

725 Part II is for Class 1 circuits. 725 Part III is for Class 2 and Class 3 circuits.

If it is the intention of the panel to exclude Class 1 circuits as well, it seems like Part II should be added to the list in 720.2

Related Item

- 3194-NFPA 70-2017

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Committee: NEC-P03

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**Public Comment No. 1429-NFPA 70-2018 [Section No. 720.3]****~~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 .~~

Statement of Problem and Substantiation for Public Comment

This is already required. This section simply repeats the requirement.

The user of chapter 7 should know that the requirements of Chapters 1 through 4 apply.

Related Item

- 3196-NFPA 70-2017

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**Public Comment No. 1181-NFPA 70-2018 [Section No. 725.2]****725.2 Definitions.****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.

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. Combining of the cables can result in less heat dissipation and signal cross talk between cables.

Nominal Current.

The designated current per conductor as specified by equipment design.

Informational Note: One example of nominal current is 4-pair Power over Ethernet (PoE) applications based on IEEE Std. 802.3-2015, *IEEE Standard for Ethernet*, that supply current over twisted pairs. The nominal current for 60-watt PoE power sourcing equipment is 0.3 amperes per conductor, where the current in one conductor can be 0.36 amperes and another conductor can be 0.24 amperes.

Additional Proposed Changes

<u>File Name</u>	<u>Description Approved</u>
CN_156.pdf	70_CN 156

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as CC Note No. 156 in the First Draft Report on First Revision Nos. 8779 & 8790.

The Correlating Committee directs the panel to take action on section 725.2 to correlate with other actions taken throughout the code with respect to the application of definitions in the XXX.2 sections.

This action will be considered as a public comment.

Related Item

• FR 8779 • FR 8790

Submitter Information Verification

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Committee: NEC-P03

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Correlating Committee Note No. 156-NFPA 70-2018 [Section No. 725.2]

Submitter Information Verification

Submitter Full Name: Sarah Caldwell

Committee:

Submittal Date: Fri May 11 09:20:18 EDT 2018

Committee Statement and Meeting Notes

Committee The Correlating Committee directs the panel to take action on section 725.2 to correlate with
Statement: other actions taken throughout the code with respect to the application of definitions in the
XXX.2 sections. This action will be considered as a public comment.

[FR-8779-NFPA 70-2018](#)

[FR-8790-NFPA 70-2018](#)

Ballot Results

✓ **This item has passed ballot**

12 Eligible Voters

0 Not Returned

12 Affirmative All

0 Affirmative with Comments

0 Negative with Comments

0 Abstention

Affirmative All

Brunssen, James E.

Dressman, Kevin L.

Hickman, Palmer L.

Hittinger, David L.

Holub, Richard A.

Johnston, Michael J.

Kovacik, John R.

Manche, Alan

McDaniel, Roger D.

Pierce, James F.

Saporita, Vincent J.

Williams, David A.



Public Comment No. 1471-NFPA 70-2018 [Section No. 725.2]

725.2 Definitions.

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.

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. Combining of the cables can result in less heat dissipation and signal cross talk between cables.

Intelligent Coordinated Power System.

A power source, or multiple network-connected power sources, with integrated communications and control which actively manages and limits the current delivered on multiple circuits to multiple loads in a coordinated fashion to avoid potential overheating, manage energy consumption or avoid other fault conditions. An Intelligent Coordinated Power Source is a type of Energy Management System.

Informational Note: An example of an intelligent coordinated power source would be a multiple port Power over Ethernet-enabled switch with communications and software enabled to utilize information obtained about the wiring connections and status, such as automated infrastructure management databases (with the gauge and bundling of wiring), requested and supplied current levels, and real-time sensing of the wiring configuration or temperature; to control current across the multiple circuits to avoid potential overheating.

Nominal Current.

The designated current per conductor as specified by equipment design.

Informational Note: One example of nominal current is 4-pair Power over Ethernet (PoE) applications based on IEEE Std. 802.3-2015, *IEEE Standard for Ethernet*, that supply current over twisted pairs. The nominal current for 60-watt PoE power sourcing equipment is 0.3 amperes per conductor, where the current in one conductor can be 0.36 amperes and another conductor can be 0.24 amperes.

Statement of Problem and Substantiation for Public Comment

Panel 13 considered this and a related PI under article 750, Energy Management Systems. In the panel statement, Panel 13 suggested that this matter would be more appropriate for article 725 and panel 3 to consider. This public comment is a follow up on Public Input No. 4265-NFPA 70-2017.

The continued evolution towards network-connected and intelligently controlled power sources allows improved safety and utility through the coordination of multiple power circuits. Article 750, Energy Management systems provides for systems which can both monitor, communicate and control the distribution of electric current to multiple circuits. Section 725.144 now envisions Internet-of-things and Power-over-Ethernet systems which provide managed power to multiple circuits and are coordinated by a network management system. These systems can manage and coordinate current delivered to the aggregate cables in a cable bundle and safely avoid situations that may result in overheating when enabled with software control to be used as an intelligent coordinated power source.

It is important to call attention that there are a large class of power sources (managed PoE switches and cabling automated information systems) which are currently deployed and would improve both safety and utility by taking advantage of the ability to coordinate outputs. In these situations, the wiring ampacity restrictions of 725.144, which are based on all circuits being at full current delivery at the same time, are overly restrictive and unnecessary because the intelligent coordinated power, as an energy management system, prevents such a case from occurring.

For example, under 725.144 as it exists, a bundle may contain 192 cables, but only 48 of them may be powered at any one time. The management and control system of an intelligent coordinated power source can combine knowledge of the current delivered on each port with the location of the power wiring in the bundle to ensure that remains the case, ensuring safe operation and no overheating more consistent with the ampacity of a 48 cable

bundle than a 192 cable bundle.

This definition is used in a companion public comment (follow on from Public Input 4264-NFPA 70-2017) which amends 725.144

Related Public Comments for This Document

Related Comment

[Public Comment No. 1474-NFPA 70-2018 \[Section No. 725.144\(A\)\]](#)

[Public Comment No. 1474-NFPA 70-2018 \[Section No. 725.144\(A\)\]](#)

Relationship

New text which uses definition added by this PC

Related Item

• Public Input No. 4265-NFPA 70-2017 • Public Input No. 4264-NFPA 70-2017 [New Section after 750.30]

Submitter Information Verification

Submitter Full Name: George Zimmerman

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Submittal Date: Tue Aug 28 18:38:03 EDT 2018

Committee: NEC-P03

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Public Comment No. 2116-NFPA 70-2018 [Section No. 725.2]

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.

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. Combining of the cables can result in less heat dissipation and signal cross talk between cables.

Nominal Current.

The designated current per conductor as specified by equipment design.

Informational Note: One example of nominal current is 4-pair Power over Ethernet (PoE) applications based on IEEE Std. 802.3-2015, *IEEE Standard for Ethernet*, that supply current over twisted pairs. The nominal current for 60-watt PoE power sourcing equipment is 0.3 amperes per conductor, where the current in one conductor can be 0.36 amperes and another conductor can be 0.24 amperes.

Statement of Problem and Substantiation for Public Comment

The proposed language is related to a group of PIs submitted on behalf of a task group appointed by the NEC Correlating Committee as referenced in Correlating Committee Note 156. The original statement of problem and substantiation of public input provided with those PIs is:

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

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

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

The definition of the term "rigid metal conduit" is appropriately located in the article that contains general, installation and construction specifications for this raceway. It is commonly understood that the term "rigid metal conduit" is used in more than one article. There are many articles that contain a single definition that is necessary for application of the contained requirements but will apply elsewhere in the NEC. This occurs in articles that address cable assemblies, raceways, systems and more.

This public input seeks to delete the last sentence in the first paragraph, as it is unnecessary. A new sentence is proposed to simply inform the user of the code that definitions are also found in the second section (XXX.2) of other articles.

This public input is supplemented with proposed revisions to the second section (XXX.2) of articles that contain definitions. New parent text is proposed for these sections to increase clarity and usability. There are two different scenarios that will be addressed. First, any second section (XXX.2) that contains definitions that apply only within that article will contain parent text as follows:

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

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

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

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

and usability with respect to application of definitions. These actions will also achieve compliance with the NEC Style Manual.

Related Item

- CN 156

Submitter Information Verification

Submitter Full Name: Christel Hunter

Organization: Cerro Wire

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Zip:

Submission Date: Thu Aug 30 19:00:39 EDT 2018

Committee: NEC-P03

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**Public Comment No. 1289-NFPA 70-2018 [Definition: Cable Bundle.]****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~~ Keeping the cables close together can result in less heat dissipation and signal cross talk between cables.

Statement of Problem and Substantiation for Public Comment

I believe that "Combing" was meant to be "combining." However, "combining" cables can be interpreted as substituting multiwire cables for standard, which I believe is not the intention here. "Keeping in close proximity" could be seen as unclear language. However, the parent text specifies the definition.

Related Item

- Based on a perception of ambiguity in FR 8779, which I believe responded to PI 1856

Submitter Information Verification

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Organization: Safety First Electrical

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Submittal Date: Sat Aug 25 21:50:20 EDT 2018

Committee: NEC-P03

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**Public Comment No. 504-NFPA 70-2018 [Definition: Cable Bundle.]****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 signal cross talk between cables.

Statement of Problem and Substantiation for Public Comment

A cable bundle is a cable bundle irrespective of the length. Moreover, NFPA definitions are not allowed to contain requirements and a minimum distance is a requirement.

Related Item

- FR8779

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler

Organization: GBH International

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Submittal Date: Thu Aug 09 15:30:26 EDT 2018

Committee: NEC-P03

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**Public Comment No. 1191-NFPA 70-2018 [Definition: Nominal Current.]****Nominal Current.**

The designated current per conductor as specified by equipment design.

Informational Note: One example of nominal current is 4-pair Power over Ethernet (PoE) applications based on IEEE Std. 802.3-2015, *IEEE Standard for Ethernet*, that supply current over twisted pairs. The nominal current for 60-watt PoE power sourcing equipment is 0.3 amperes per conductor, where the current in one conductor can be 0.36 amperes and another conductor can be 0.24 amperes.

Additional Proposed Changes

<u>File Name</u>	<u>Description Approved</u>
CN_139.pdf	70_CN139

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as CC Note No. 139 in the First Draft Report on First Revision No. 8790.

The Correlating Committee directs the panel to reconsider the text in the last sentence of the Informational Note with respect to requirements.

This action will be considered as a public comment.

Related Item

- First Revision No. 8790

Submitter Information Verification

Submitter Full Name: CC on NEC-AAC

Organization: NEC Correlating Committee

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Submission Date: Fri Aug 24 10:32:19 EDT 2018

Committee: NEC-P03

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**Correlating Committee Note No. 139-NFPA 70-2018 [New Definition after Definition: Class 3 Circuit.]****Submitter Information Verification**

Submitter Full Name: Erik Hohengasser

Committee:

Submittal Date: Thu May 10 16:37:41 EDT 2018

Committee Statement and Meeting Notes

Committee Statement: The Correlating Committee directs the panel to reconsider the text in the last sentence of the Informational Note with respect to requirements.

This action will be considered as a public comment.

First Revision No. 8790-NFPA 70-2018 [New Definition after Definition: Class 3 Circuit.]

Ballot Results

✔ This item has passed ballot

12 Eligible Voters

0 Not Returned

12 Affirmative All

0 Affirmative with Comments

0 Negative with Comments

0 Abstention

Affirmative All

Brunssen, James E.

Dressman, Kevin L.

Hickman, Palmer L.

Hittinger, David L.

Holub, Richard A.

Johnston, Michael J.

Kovacik, John R.

Manche, Alan

McDaniel, Roger D.

Pierce, James F.

Saporita, Vincent J.

Williams, David A.



Public Comment No. 1903-NFPA 70-2018 [Definition: Nominal Current.]

Nominal Rated Current.

~~The designated Rated Current~~ for power sources is the output current per conductor ~~as specified by equipment design; the power source is designed to deliver to an operational load at normal operating conditions, as declared by the manufacturer.~~ In systems sourcing output current shared over multiple conductors in a cable with multiple twisted pair conductors, the maximum current in any shared conductor may not exceed 20% of the normal operating current.

Informational Note: One example of nominal current is 4-pair Power over Ethernet (PoE) applications based on IEEE Std. 802.3-2015, *IEEE Standard for Ethernet*, that supply current over twisted pairs. The nominal current for 60-watt PoE power sourcing equipment is 0.3 amperes per conductor, where the current in one conductor can be 0.36 amperes and another conductor can be 0.24 amperes.

Statement of Problem and Substantiation for Public Comment

This comment will remove any potential confusion over the term "Nominal Current". There will be some potential ripple effects from comments impacting 725.144 that will require correlation.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 1941-NFPA 70-2018 [Section No. 725.121(C)]	
Public Comment No. 1946-NFPA 70-2018 [Section No. 725.144(A)]	

Related Item

- Nominal Current

Submitter Information Verification

Submitter Full Name: Joel Goergen
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Submission Date: Thu Aug 30 11:45:21 EDT 2018
Committee: NEC-P03

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Public Comment No. 769-NFPA 70-2018 [Definition: Nominal Current.]

Nominal Current.

The designated current per conductor as specified by equipment design.

~~Informational Note: One example of nominal current is 4-pair Power over Ethernet (PoE) applications based on IEEE Std. 802.3-2015, *IEEE Standard for Ethernet*, that supply current over twisted pairs. The nominal current for 60-watt PoE power sourcing equipment is 0.3 amperes per conductor, where the current in one conductor can be 0.36 amperes and another conductor can be 0.24 amperes.~~

Statement of Problem and Substantiation for Public Comment

This Public Comment was developed by a task group convened by request of the NEC Correlating Committee to resolve the difference between the language of 'nominal current' in 725.144 and 'rated current' in 840.160. The members of the "Nominal vs. Rated Task Group" included Ernie Gallo, George Zimmerman, Stan Kaufman, Bill McCoy, Randy Ivans, Chad Jones, Christel Hunter, Jim Wiese, Jim Brunssen, Dan Ashton, Terry Coleman, John Fuller, Joel Goergen and Bill Szeto.

The definition 'Nominal Current' is no longer used. The Task Group recommends these changes to align the text of 840.160 and 725.144.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 755-NFPA 70-2018 [Section No. 725.144 [Excluding any Sub-Sections]]	
Public Comment No. 763-NFPA 70-2018 [Section No. 725.144(A)]	
Public Comment No. 765-NFPA 70-2018 [Section No. 725.144(B)]	
Public Comment No. 766-NFPA 70-2018 [Section No. 725.121(C)]	
Public Comment No. 772-NFPA 70-2018 [Section No. 840.160]	
Public Comment No. 755-NFPA 70-2018 [Section No. 725.144 [Excluding any Sub-Sections]]	
Public Comment No. 763-NFPA 70-2018 [Section No. 725.144(A)]	
Public Comment No. 765-NFPA 70-2018 [Section No. 725.144(B)]	
Public Comment No. 766-NFPA 70-2018 [Section No. 725.121(C)]	
Public Comment No. 772-NFPA 70-2018 [Section No. 840.160]	

Related Item

- FR 8790

Submitter Information Verification

Submitter Full Name: Ernest Gallo
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Affiliation: Correlating Committee-appointed Nominal Vs Rated Task Group
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Submittal Date: Fri Aug 17 10:47:37 EDT 2018
Committee: NEC-P03

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**Public Comment No. 172-NFPA 70-2018 [Section No. 725.3(C)]****(C) Ducts, Plenums, and Other Air-Handling Spaces.**

Class 1, 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).

Statement of Problem and Substantiation for Public Comment

The word deleted is a typographical error.

Related Item

- PI-89

Submitter Information Verification

Submitter Full Name: Masood Shariff

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Affiliation: TIA

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Submission Date: Fri Jul 06 12:17:23 EDT 2018

Committee: NEC-P03

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**Public Comment No. 1185-NFPA 70-2018 [Section No. 725.3(D)]****(D) Hazardous (Classified) Locations.**

Sections 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, where installed in hazardous (classified) locations.

Additional Proposed Changes

<u>File Name</u>	<u>Description Approved</u>
CN_141.pdf	70_CN 141

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as CC Note No. 141 in the First Draft Report on First Revision No. 8879.

The Correlating Committee directs that this first revision be rewritten to comply with the NEC Style Manual as a complete sentence with the inclusion of mandatory text.

This action will be considered as a public comment.

Related Item

- FR 8879

Submitter Information Verification

Submitter Full Name: CC on NEC-AAC

Organization: NEC Correlating Committee

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Submission Date: Fri Aug 24 10:20:28 EDT 2018

Committee: NEC-P03

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Correlating Committee Note No. 141-NFPA 70-2018 [Section No. 725.3(D)]

Submitter Information Verification

Submitter Full Name: Erik Hohengasser

Committee:

Submittal Date: Thu May 10 16:47:18 EDT 2018

Committee Statement and Meeting Notes

Committee Statement: The Correlating Committee directs that this first revision be rewritten to comply with the NEC Style Manual as a complete sentence with the inclusion of mandatory text.

This action will be considered as a public comment.

First Revision No. 8879-NFPA 70-2018 [Section No. 725.3(D)]

Ballot Results

✓ **This item has passed ballot**

12 Eligible Voters

0 Not Returned

12 Affirmative All

0 Affirmative with Comments

0 Negative with Comments

0 Abstention

Affirmative All

Brunssen, James E.

Dressman, Kevin L.

Hickman, Palmer L.

Hittinger, David L.

Holub, Richard A.

Johnston, Michael J.

Kovacik, John R.

Manche, Alan

McDaniel, Roger D.

Pierce, James F.

Saporita, Vincent J.

Williams, David A.



Public Comment No. 113-NFPA 70-2018 [Sections 725.3(M), 725.3(N)]

Sections 725.3(M), 725.3(N)

(M) 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 805 800 .154(c b) , listed in accordance with 805 800 .182, and installed in accordance with 805 800 .110(C) and 805 800 .113.

(N) 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 805 800 .154(b a) , listed in accordance with 805 800 .182, and installed in accordance with 805 800 .113 and 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing (ENT) apply.

Statement of Problem and Substantiation for Public Comment

This PC coordinates with PC 61 which moves the listing, applications and installation rules for communications raceways, and cable routing assemblies from Article 805 (formerly Article 800) into new general Article 800.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 61-NFPA 70-2018 [New Section after 800.179]	
Public Comment No. 114-NFPA 70-2018 [Sections 760.3(L), 760.3(M)]	Coordinating PC for Article 760
Public Comment No. 114-NFPA 70-2018 [Sections 760.3(L), 760.3(M)]	

Related Item

- FR 7512

Submitter Information Verification

Submitter Full Name: Terry Peters
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Committee: NEC-P03

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**Public Comment No. 1936-NFPA 70-2018 [New Section after 725.3(O)]**(P) Identification of Equipment Grounding Conductors .

Section 250.119, Identification of Equipment Grounding Conductors, shall not apply to Types CL3P, CL2P, CL3R, CL2R, CL3, CL2, CL3X, CL2X and substitute cables installed in accordance with 725.154(A).

Informational Note: The green wires in Class 2 cables, Class 3 cables and communications cables are signal wires, not ground wires.

Statement of Problem and Substantiation for Public Comment

The issue is the inadvertent grounding of communications cables used by all systems within the scope of Article 725. In the last three years, systems operating at 60 VDC have been introduced into the Code, operating above the threshold value listed within the exemption present in 250.119 concerning grounding and use of a green conductor.

While resolution should occur within Art 250.119 and CMP5, making a change here in response to PI 1743 lowers risk of improper installation leading to system failure. While Art 725 systems are not typically FLS, many augment FLS systems and with the increase of system integration and sharing of information, a failure in one linked system lowers overall integrated effectiveness.

For reference:

Public Input No. 1743 for 250.119 recommended exempting all Class 2, Class 2 and communications cables from the requirement to ground the green wires.

The substantiation for PI 1743 states:

“Class 2, Class 3, power-limited fire alarm and communications cables all have a color code that includes green wires. These green wires are not intended for grounding; they are signal wires. It is inappropriate to limit the voltage to 50 volts as contained in the original text. Class 2 and Class 3 circuits may operate at voltages exceeding 50 volts. Introduction of Power over Ethernet (PoE) requirements into the NEC 2017 Edition permits a voltage of 60 volts on communications conductors. References to specific sections of Articles 725, 760 and 800 are added to clarify the application of Exception No. 1.”

PI 1743 was resolved with the statement:

“No technical substantiation has been provided to raise the threshold above 50 volts.”

Section 90.3 Code Arrangement, permits Chapter 7 to supplement or modify the requirements of Chapters 1 through 4. The recommended text of this Public Comment implements the recommendation of PI 1743 by modifying the requirements of 250.119 as permitted by 90.3.

Related Item

- PI 1743

Submitter Information Verification

Submitter Full Name: Jeff Silveira

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Submission Date: Thu Aug 30 12:43:48 EDT 2018

Committee: NEC-P03

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Public Comment No. 510-NFPA 70-2018 [Section No. 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). Metallic means of support for flexible conduit and conductors shall be used in spaces above egress, which includes doorways, hallways, stairways, corridors, passageways, lobbies, landings, and equivalent spaces.

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.

Statement of Problem and Substantiation for Public Comment

The panel rejected this PI because it was not provided to all corresponding sections. This public comment is being submitted to article 725 (in this PC) and to articles 760, 770 and 805 (in other PCs). The submitter of PI 3233 is correct in stating that "Nonmetallic supports exhibit significant weakening and failure during fires which can affect the safety of occupants and emergency personnel entering and exiting buildings due to entanglement in fallen cable." There are abundant examples of firefighters getting trapped under mazes of cables falling as a result of inadequate supports (perhaps because they burnt or because they lost strength during a fire). I will not repeat here all the information provided by the original submitted but will include the bibliography, as follows:

[1] Fire Engineering Training Minutes. Presented by Mike Ciampo, Fire Department of New York.

<http://www.fireengineering.com/topics/m/video/36928837/the-quick-release-method.htm?q=cable+entanglement>

[2] Chubb, M., and Joe Caldwell. 3/1/1995. "Tragedy in a Residential High-Rise, Memphis, Tennessee." Fire Engineering. <http://www.fireengineering.com/articles/print/volume-148/issue-3/features/tragedy-in-a-residential-high-rise-memphistennessee.html>

[3] April 15, 2013. "Shirley Towers flats blaze: 'Possible safety breaches'". BBC. <http://www.bbc.co.uk/news/uk-englandhampshire-22126431>

[4] Rawlinson, J. August 2014, Vol. 34, No. 8, "Change for the Better." Electrical Contracting News (ECN), pp. 24-25.

<http://edition.pagesuiteprofessional.co.uk/Launch.aspx?EID=dd8a7ebe-4f8b-4aa6-a9a1-d6b4692f6a23>

[5] BS 7671:2008+A2:2013, Requirements for electrical installations. IET Wiring Regulations. Seventeenth edition.

[6] BS 5839-1:2013, Fire detection and fire alarm systems for buildings. Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises

Related Public Comments for This Document

Related Comment

Relationship

[Public Comment No. 513-NFPA 70-2018 \[Section No. 770.24\]](#)

[Public Comment No. 514-NFPA 70-2018 \[Section No. 805.24\]](#)

Related Item

- PI3233

Submitter Information Verification

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Submittal Date: Thu Aug 09 17:45:26 EDT 2018

Committee: NEC-P03

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**Public Comment No. 40-NFPA 70-2018 [Section No. 725.48(B)(1)]**

(1) In a Cable, Enclosure, or Raceway.

Class 1 circuits and power-supply circuits shall be permitted to occupy the same cable, enclosure, or raceway ~~only where the~~ under either of the following conditions:

(1) ~~Where the~~ equipment powered is functionally associated. ~~Class 1 circuits shall be permitted to be installed together with the conductors of electric light, power,~~

(2) ~~With~~ non-power-limited fire alarm, and medium power network-powered broadband communications circuits where separated by a barrier.

Statement of Problem and Substantiation for Public Comment

The FR 8994 as currently written could create confusion with enforcement as the second sentence appears to be in conflict with the first sentence. For editorial clarity, the article should be written as an opening sentence with a list of permissible conditions. There are TC-ER-JP cables available for optional standby generator installation that combine the power and Class 1 600V control conductors in the same cable assembly, and the current FR could require a barrier in those cables where it is not required in the 2017 NEC.

Related Item

- FR 8994 NFPA 70-2018

Submitter Information Verification

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Submittal Date: Wed Jun 27 10:08:49 EDT 2018

Committee: NEC-P03

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**Public Comment No. 1186-NFPA 70-2018 [Section No. 725.121(A)]****(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
- (4) 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 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 listed battery source or battery source system identified as Class 2

Additional Proposed Changes

<u>File Name</u>	<u>Description Approved</u>
CN_142.pdf	70_CN 142

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as CC Note No. 142 in the First Draft Report on First Revision No. 8835.

The Correlating Committee directs that the panel to reconsider the text of the informational note No. 1 that references Figure 725.121.

This action will be considered as a public comment.

Related Item

- FR 8835

Submitter Information Verification**Submitter Full Name:** CC on NEC-AAC**Organization:** NEC Correlating Committee**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Aug 24 10:22:25 EDT 2018**Committee:** NEC-P03**Copyright Assignment**

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Correlating Committee Note No. 142-NFPA 70-2018 [Section No. 725.121(A)]

Submitter Information Verification

Submitter Full Name: Erik Hohengasser

Committee:

Submittal Date: Thu May 10 16:49:27 EDT 2018

Committee Statement and Meeting Notes

Committee Statement: The Correlating Committee directs that the panel to reconsider the text of the informational note No. 1 that references Figure 725.121.

This action will be considered as a public comment.

[First Revision No. 8835-NFPA 70-2018 \[Section No. 725.121\(A\)\]](#)

Ballot Results

✓ **This item has passed ballot**

12 Eligible Voters

0 Not Returned

12 Affirmative All

0 Affirmative with Comments

0 Negative with Comments

0 Abstention

Affirmative All

Brunssen, James E.

Dressman, Kevin L.

Hickman, Palmer L.

Hittinger, David L.

Holub, Richard A.

Johnston, Michael J.

Kovacik, John R.

Manche, Alan

McDaniel, Roger D.

Pierce, James F.

Saporita, Vincent J.

Williams, David A.



Public Comment No. 1547-NFPA 70-2018 [Section No. 725.121(A)]

(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
- (4) 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 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 ~~listed~~ battery source or battery source system that is listed and identified as Class 2

Statement of Problem and Substantiation for Public Comment

As written, it could be construed that any listed battery, regardless of energy level, can be used as a class II source. Re-arranging the sentence clarifies that it must be listed as class II

Related Item

- 2484-NFPA 70-2017

Submitter Information Verification

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Committee: NEC-P03

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Public Comment No. 2109-NFPA 70-2018 [Section No. 725.121(A)]

(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.

The direct-current limits in Table 11(B) in chapter 9 apply to continuous DC as well as DC that is delivered in pulses, bursts, packets, or other intermittent method. If non-continuous, the effective maximum values of current and power that the power source can deliver shall be used to determine conformance with Table 11(B) in chapter 9.

- (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
- (4) 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 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 listed battery source or battery source system identified as Class 2

Statement of Problem and Substantiation for Public Comment

This clarification was originally provided in Public Input No. 3992-NFPA 70-2017. The rationale in the response, indicates that the concern and rationale for the PI was mis-understood. This clarification is not due to an electrical shock hazard concern, but rather a "cable fire issue". There are at least two manufacturers who are claiming that the values in Table 11b do not apply to power sources that use pulsed or packetized bursts of DC power on Class 2/3 and communications cables. Table 11b is for continuous DC and also has provisions in the notes for 10Hz to 200Hz pulsed DC. In one case the products frequency of the DC Bursts is in the 700Hz Range, so it outside the ranges covered in the Table and note.

To be clear this is not a shock issue and it may be perfectly safe to the touch. However, they are advertising wattages up to effectively 2400 watts on one pair of a LAN/Ethernet cable, with effectively 7+ amps at over 300V peak. Powering HVAC to refrigerators to lightning. But because the marketing claim is that there are no limits for Pulsed/packetized DC at 700 Hz, the values in Table 11b do not apply.

This clarification text is needed in sections 725.121, 840.170, and Table 11b. in order to clarify that technologies are not exempt from the values in Table 11b by using loopholes or mis-interpretation or naming their electrical outputs by some new name. One of these companies claims in public videos that they have deployments of this type in over 400 public locations including commercial buildings and sports stadiums.

Related Item

• Public Input No. 3992-NFPA
70-2017

• Public Input No. 3986-NFPA
70-2017

• Public Input No. 4015-NFPA
70-2017

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Public Comment No. 2119-NFPA 70-2018 [Section No. 725.121(A)]

(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
- (4) 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

Power source(s) of Listed audio/video, information technology (computer), communications equipment that deliver power over Class 2/Class 3 and/or premises communications cables and wiring shall be limited in accordance with Table 11(B) in Chapter 9 for voltage sources up to 60 V dc.

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 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 listed battery source or battery source system identified as Class 2

Statement of Problem and Substantiation for Public Comment

Originally proposed as part of Public Input No. 3491-NFPA 70-2017. The original proposal was to harmonize with section 840.170 and it was rejected, even though the equipment used and the cabling would be identical.

This proposal has been reworked to use a key factor of the original proposal so that the applicable portion of A(4) is consistent with the equipment Listing standards and 840.170. It is key for this classification of equipment that uses UL/CSA 62368-1 or UL/CSA 60950-1 as the Listing standard to be aligned with the requirements of the Listing standard itself. As a member of the US TAG and 62368-1 Technical harmonization committee I can assure

you that this information is necessary, otherwise the safety standards could start allowing up to 120VDC or 150VDC (general Class 2/3 limits) on various ports.

UL/CSA 60950-1 limits these circuits to TNV or SELV which cannot exceed 60 VDC (and the values in Table 11b) up to the 60 VDC column. IEC 62368-1 is intended to have the same limits and work is underway to close the gap between the intent and the actual requirements in that Listing standard. This was accomplished by the THC on 8/23/18. This also aligns with article 840.170(G) and ANSI/ATIS 0600337 which was recently added as a reference in the NEC first revision for voltages and currents and power found in communications networks (see FR-7779 and first revision for 840.170).

This limitation is also discussed in the most recent ITU-T K.50 standard as well as the most recent version of Telcordia GR-1089-CORE. Obviously the main technology currently is PoE which is also limited to 60 VDC based on all these other standards.

NFPA 70e is also a factor where it says that voltages under 60 VDC are considered safe, and thus voltages over that need special precautions as they are less than safe.

The Canadian Electrical code also supports the 60 VDC max.

Therefore it is important that for this ITE/ AV / communications class of Listed equipment to have cabling and installation requirements in the NEC align with the safety standards which limit the output to the 60VDC column of Table 11b. Otherwise the safety standards will interpret up to 150 VDC is allowed, and the limits will be pushed by the new technologies.as they try to deliver more power over smaller copper wires, in larger bundles and they are more accessible to the general public.

Related Item

- Public Input No. 3491-NFPA 70-2017

Submitter Information Verification

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Submission Date: Thu Aug 30 19:13:59 EDT 2018

Committee: NEC-P03

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**Public Comment No. 1426-NFPA 70-2018 [New Section after 725.121(C)]****725.122 Working Clearances**

The working clearances in 110.26(A) shall not apply to Class II systems.

Statement of Problem and Substantiation for Public Comment

The working clearances in 110.26(A) are given to protect the worker from shock hazard. The definition of Class II systems states that there is an acceptable protection from electric shock. As currently written, the first row of the table in 110.26(A)(1) is "0 - 150" volts. This would even include 5 volts DC.

Currently, the provision for relaxing working clearances requires special permission (Written) from the AHJ, and only applies to the depth.

Related Public Comments for This Document**Related Comment**

Public Comment No. 1304-NFPA 70-2018 [Section No. 110.26(A)]

Relationship

Working clearances for Class II systems

Related Item

• 2520-NFPA 70-2017 • 2519-NFPA 70-2017

Submitter Information Verification

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Submittal Date: Tue Aug 28 13:18:28 EDT 2018

Committee: NEC-P03

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**Public Comment No. 1941-NFPA 70-2018 [Section No. 725.121(C)]****(C) Marking.**

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 ~~maximum current or maximum voltage and nominal current output~~ Rated current 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.

Statement of Problem and Substantiation for Public Comment

This comment removes confusion over the term "nominal current".

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 1903-NFPA 70-2018 [Definition: Nominal Current.]	Nominal Current
Public Comment No. 1946-NFPA 70-2018 [Section No. 725.144(A)]	

Related Item

- Nominal Current

Submitter Information Verification

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Committee: NEC-P03

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Public Comment No. 766-NFPA 70-2018 [Section No. 725.121(C)]

(C) Marking.

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 maximum current or maximum voltage and ~~nominal~~ 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.

Informational Note: Rated Current for power sources covered under 725.144 is the highest output current per conductor the power source is designed to deliver to an operational load at normal operating conditions, as declared by the manufacturer.

Statement of Problem and Substantiation for Public Comment

This Public Comment was developed by a task group convened by request of the NEC Correlating Committee to resolve the difference between the language of 'nominal current' in 725.144 and 'rated current' in 840.160. The members of the "Nominal vs. Rated Task Group" included Ernie Gallo, George Zimmerman, Stan Kaufman, Bill McCoy, Randy Ivans, Chad Jones, Christel Hunter, Jim Wiese, Jim Brunssen, Dan Ashton, Terry Coleman, John Fuller, Joel Goergen and Bill Szeto.

Clarification is provided by replacing the word 'nominal' with 'rated' along with the added informational note of PC 755 describing that rated current includes the unbalance that was referred to under 'nominal current'. The added informational note provides additional clarity to the term 'rated current'. The Task Group recommends these changes to align the text of 840.160 and 725.144.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 755-NFPA 70-2018 [Section No. 725.144 [Excluding any Sub-Sections]]	
Public Comment No. 763-NFPA 70-2018 [Section No. 725.144(A)]	
Public Comment No. 765-NFPA 70-2018 [Section No. 725.144(B)]	
Public Comment No. 769-NFPA 70-2018 [Definition: Nominal Current.]	
Public Comment No. 772-NFPA 70-2018 [Section No. 840.160]	
Public Comment No. 755-NFPA 70-2018 [Section No. 725.144 [Excluding any Sub-Sections]]	
Public Comment No. 763-NFPA 70-2018 [Section No. 725.144(A)]	
Public Comment No. 765-NFPA 70-2018 [Section No. 725.144(B)]	
Public Comment No. 769-NFPA 70-2018 [Definition: Nominal Current.]	
Public Comment No. 772-NFPA 70-2018 [Section No. 840.160]	

Related Item

- FR 8859

Submitter Information Verification

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Zip:**Submittal Date:** Fri Aug 17 10:35:56 EDT 2018**Committee:** NEC-P03**Copyright Assignment**

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Public Comment No. 1262-NFPA 70-2018 [Section No. 725.144]

725.144 Transmission of 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. 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.

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
			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
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
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
23	-	-	1.24	1.53	1.78	0.89	1.11	1.28	0.67	0.83	0.97	0.58	0.72	0.83	0.59
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

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 ampacities in Table 725.144 shall apply to the nominal current 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 the equation in 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 nominal current does not exceed 0.3 amperes in any conductor.

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 at a current level 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 ampacity 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)(2) shall apply. The Class 2-LP and Class 3-LP cables shall comply with the following, as applicable:

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

- (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.

Statement of Problem and Substantiation for Public Comment

The entry for Table 725.144, 23AWG row, 62-91 bundle size, 60C is larger than the entry for 23AWG, 38-61, 60C. Obviously, physics prevents this. By analyzing the ratios between columns, it appears the entry for 23AWG, 62-91, 60C should be 0.49 and not 0.59. This number will be confirmed by recreating the data from the FFR that generated this table. The FFR author has been asked to confirm that 0.49 is the correct number and the CMP3 member submitting this comment will be sure to have the answer for the SR meeting.

Related Item

- FR-8941

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**Public Comment No. 1474-NFPA 70-2018 [Section No. 725.144(A)]****(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 ampacities in Table 725.144 shall apply to the nominal current 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 the equation in 310.15(B) shall apply.

Exception No. 1 : Compliance with Table 725.144 shall not be required for installations where all circuits in transmitting power and data in the bundle are managed by an Intelligent Coordinated Power System.

Exception No. 2: Compliance with Table 725.144 shall not be required for installations where conductors are 24 AWG or larger and the nominal current does not exceed 0.3 amperes in any conductor.

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.

Statement of Problem and Substantiation for Public Comment

Panel 13 considered this and a related PI under article 750, Energy Management Systems. In the panel statement, Panel 13 suggested that this matter would be more appropriate for article 725 and panel 3 to consider.

The continued evolution towards network-connected and intelligently controlled power sources allows improved safety and utility through the coordination of multiple power circuits. Article 750, Energy Management systems provides for systems which can both monitor, communicate and control the distribution of electric current to multiple circuits. Similarly, power and data circuits subject to 725.144 are often provided by systems capable of monitoring and managing current simultaneously across the multiple circuits in a bundle. Internet-of-things and Power-over-Ethernet systems can manage and coordinate current delivered to the aggregate cables in a cable bundle and safely avoid situations that may result in overheating when enabled with software control to be used as an intelligent coordinated power source.

It is important to call attention that there are a large class of power sources (managed PoE switches and cabling automated information systems) which are currently deployed and would improve both safety and utility by taking advantage of the ability to coordinate outputs. These are particularly used in situations where the cable heating justification for 725.144 is a concern, i.e., those with many powered circuits, Power over Ethernet is usually delivered from multiport switches, and often these switches are managed and capable of intelligently coordinating the power across ports. When the power sources supplying current are controlled in an intelligent coordinated power system, the wiring ampacity restrictions of 725.144, which are based on all circuits being at full current delivery at the same time, are overly restrictive and unnecessary because the system prevents overheating from occurring by monitoring and controlling the current delivered.

For example, in most installations, low voltage cabling connected to switches providing power and data are intermixed with those providing data only. Additionally, it is unusual, and in some cases impossible because of the limits of power supplies shared across multiple ports, for all circuits to be at the maximum rated current for the port simultaneously. Because heat is only generated by the actual current in a cable, and only by the cables providing power, bundles in such practical installations have substantially lower temperature rise than used to derive the ampacities in 725.144.

More specifically, under 725.144 as it exists, a bundle may have 192 cables, but only 48 of them may be powered at any one time. The management and control system of an intelligent coordinated power source can combine knowledge of the current delivered on each port with the location of the power wiring in the bundle to ensure that remains the case, ensuring safe operation and no overheating more consistent with the ampacity of a 48 cable bundle than a 192 cable bundle.

Enabling this management will both ease deployment and improve safety by encouraging this automated technique to manage safety.

Related Public Comments for This Document**Related Comment****Relationship**

[Public Comment No. 1471-NFPA 70-2018 \[Section No. 725.2\]](#)

Definition of Intelligent Coordinated Power System

[Public Comment No. 1471-NFPA 70-2018 \[Section No. 725.2\]](#)

Related Item

• Public Input No. 4265-NFPA 70-2017 • Public Input No. 4264-NFPA 70-2017 [New Section after 750.30]

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Public Comment No. 1946-NFPA 70-2018 [Section No. 725.144(A)]

(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 ampacities in Table 725.144 shall apply to the ~~nominal current~~ rated current 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 the equation in 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 ~~nominal~~ rated current does not exceed 0.3 amperes in any conductor.

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.

Statement of Problem and Substantiation for Public Comment

Replaces the term "nominal current" with "rated current" to avoid potential confusion.

Related Public Comments for This Document

Related Comment

Public Comment No. 1903-NFPA 70-2018 [Definition: Nominal Current.]

Public Comment No. 1941-NFPA 70-2018 [Section No. 725.121(C)]

Relationship

Related Item

- Nominal Current

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Public Comment No. 763-NFPA 70-2018 [Section No. 725.144(A)]

(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- shall apply to the nominal current- 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 the equation in 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 nominal current- the rated current per conductor of the power source does not exceed 0.3 amperes in any conductor.

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.

Statement of Problem and Substantiation for Public Comment

This Public Comment was developed by a task group convened by request of the NEC Correlating Committee to resolve the difference between the language of 'nominal current' in 725.144 and 'rated current' in 840.160. The members of the "Nominal vs. Rated Task Group" included Ernie Gallo, George Zimmerman, Stan Kaufman, Bill McCoy, Randy Ivans, Chad Jones, Christel Hunter, Jim Wiese, Jim Brunssen, Dan Ashton, Terry Coleman, John Fuller, Joel Goergen and Bill Szeto.

Clarification is provided by using 'rated current per conductor of the power source' and replacement of the word 'nominal' with 'rated' along with the added informational note of PC 755 describing that rated current includes the unbalance that was referred to under 'nominal current'. The Task Group recommends these changes to align the text of 840.160 and 725.144.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 755-NFPA 70-2018 [Section No. 725.144 [Excluding any Sub-Sections]]	
Public Comment No. 765-NFPA 70-2018 [Section No. 725.144(B)]	
Public Comment No. 766-NFPA 70-2018 [Section No. 725.121(C)]	
Public Comment No. 769-NFPA 70-2018 [Definition: Nominal Current.]	
Public Comment No. 772-NFPA 70-2018 [Section No. 840.160]	
Public Comment No. 755-NFPA 70-2018 [Section No. 725.144 [Excluding any Sub-Sections]]	
Public Comment No. 765-NFPA 70-2018 [Section No. 725.144(B)]	
Public Comment No. 766-NFPA 70-2018 [Section No. 725.121(C)]	
Public Comment No. 769-NFPA 70-2018 [Definition: Nominal Current.]	
Public Comment No. 772-NFPA 70-2018 [Section No. 840.160]	

Related Item

- FR 8941

Submitter Information Verification

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Zip:**Submittal Date:** Fri Aug 17 09:29:47 EDT 2018**Committee:** NEC-P03**Copyright Assignment**

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**Public Comment No. 325-NFPA 70-2018 [Section No. 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 at a current level 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 ampacity 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)(2) shall apply. The Class 2-LP and Class 3-LP cables shall comply with the following, as applicable:

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

- (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.

Statement of Problem and Substantiation for Public Comment

FR- 8934 changed the term “ampere limit” to “current limit” because current limit is “the more appropriate terminology”. This change was made in the first sentence of 725.144(B) and in 725.144((B)(2).

FR-8936 for 725.179(I), which has the listing requirements for LP cables, also changed “ampere limit” to “current limit”.

FR- 8934 also added second sentence to 725.144(B):

“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 ampacity 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)(2) shall apply.”

The term “marked ampacity” is incorrect; it should be changed to “marked current limit” to be consistent with the other changes introduced in FR-8934 and FR-8936.

Related Item

• FR-8934 • FR-8936

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Public Comment No. 765-NFPA 70-2018 [Section No. 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 at from a current-level 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 ampacity 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)(2) shall apply. The Class 2-LP and Class 3-LP cables shall comply with the following, as applicable:

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

- (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 a limited power (LP) cable is a cable marked Type CL2-LP(0.5A), 23 AWG.

Statement of Problem and Substantiation for Public Comment

This Public Comment was developed by a task group convened by request of the NEC Correlating Committee to resolve the difference between the language of ‘nominal current’ in 725.144 and ‘rated current’ in 840.160. The members of the “Nominal vs. Rated Task Group” included Ernie Gallo, George Zimmerman, Stan Kaufman, Bill McCoy, Randy Ivans, Chad Jones, Christel Hunter, Jim Wiese, Jim Brunssen, Dan Ashton, Terry Coleman, John Fuller, Joel Goergen and Bill Szeto.

Clarification is provided by using ‘power source with a rated current per conductor’ along with the added informational note of PC 755 describing that rated current includes the unbalance that was referred to under ‘nominal current’. The Task Group recommends these changes to align the text of 840.160 and 725.144. The informational note was relocated to follow the text to which it applies.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 755-NFPA 70-2018 [Section No. 725.144 [Excluding any Sub-Sections]]	
Public Comment No. 763-NFPA 70-2018 [Section No. 725.144(A)]	
Public Comment No. 766-NFPA 70-2018 [Section No. 725.121(C)]	
Public Comment No. 769-NFPA 70-2018 [Definition: Nominal Current.]	
Public Comment No. 772-NFPA 70-2018 [Section No. 840.160]	
Public Comment No. 755-NFPA 70-2018 [Section No. 725.144 [Excluding any Sub-Sections]]	
Public Comment No. 763-NFPA 70-2018 [Section No. 725.144(A)]	
Public Comment No. 766-NFPA 70-2018 [Section No. 725.121(C)]	
Public Comment No. 769-NFPA 70-2018 [Definition: Nominal Current.]	
Public Comment No. 772-NFPA 70-2018 [Section No. 840.160]	

Related Item

- FR 8941

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Committee: NEC-P03

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Public Comment No. 1255-NFPA 70-2018 [Section No. 725.144 [Excluding any Sub-Sections]]

Sections 725.144(A) and (B) shall apply to Class 2 and Class 3 circuits that transmit power and data to a powered device. 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 under 725.144 is the highest 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%. An increase in current in one conductor is 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		
	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
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
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
23	-	-	-	1.24	1.53	1.78	0.89	1.11	1.28	0.67	0.83	0.97	0.58	0.72	0.83
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

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.

Statement of Problem and Substantiation for Public Comment

This comment is filed on behalf of the IEEE 802.3 Working Group.

IEEE 802.3 believes that using different terms ("nominal current" in 725.121(C) and 725.144 and "rated current" in 840.160) leads to confusion. We recommend that 725.121(C) and 725.144 use "rated current" along with an informational note to clarify the meaning of "rated current" as the highest output current per conductor that the

power source is designed to deliver excluding fault and transient conditions, and making allowance for unbalance found in these systems will provide more usable code. IEEE 802.3 supports the work of the Correlating Committee commissioned PoE TG that developed the following informational note (as covered in PC755 along with companions PC763, PC765, PC766, PC769, and PC772 filed by Ernest Gallo on behalf of the TG):
Informational Note No. 6: Rated Current for power sources covered under 725.144 is the highest 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%. An increase in current in one conductor is offset by a corresponding decrease in current in one or more conductors of the same cable.

Related Item

- FR-8941

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Public Comment No. 755-NFPA 70-2018 [Section No. 725.144 [Excluding any Sub-Sections]]

Informational Note No. 6: **R**ated Current for power sources covered under 725.144 is the highest 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%. An increase in current in one conductor is offset by a corresponding decrease in current in one or more conductors of the same cable.

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.

Statement of Problem and Substantiation for Public Comment

This Public Comment was developed by a task group convened by request of the NEC Correlating Committee to resolve the difference between the language of 'nominal current' in 725.144 and 'rated current' in 840.160. The members of the "Nominal vs. Rated Task Group" included Ernie Gallo, George Zimmerman, Stan Kaufman, Bill McCoy, Randy Ivans, Chad Jones, Christel Hunter, Jim Wiese, Jim Brunssen, Dan Ashton, Terry Coleman, John Fuller, Joel Goergen and Bill Szeto.

The added informational note clarifies rated current in that the current in one conductor may deviate from the rated value, but an increase in one conductors is offset by a corresponding decrease in current in one or more conductors of the same cable. The proposed informational note identifies that rated current includes the unbalance that was referred to under 'nominal current'. the Task Group recommends these changes to align the text of 840.160 and 725.144.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 763-NFPA 70-2018 [Section No. 725.144(A)]	
Public Comment No. 765-NFPA 70-2018 [Section No. 725.144(B)]	
Public Comment No. 766-NFPA 70-2018 [Section No. 725.121(C)]	
Public Comment No. 769-NFPA 70-2018 [Definition: Nominal Current.]	
Public Comment No. 772-NFPA 70-2018 [Section No. 840.160]	
Public Comment No. 763-NFPA 70-2018 [Section No. 725.144(A)]	
Public Comment No. 765-NFPA 70-2018 [Section No. 725.144(B)]	
Public Comment No. 766-NFPA 70-2018 [Section No. 725.121(C)]	
Public Comment No. 769-NFPA 70-2018 [Definition: Nominal Current.]	
Public Comment No. 772-NFPA 70-2018 [Section No. 840.160]	

Related Item

- FR 8941

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Public Comment No. 501-NFPA 70-2018 [Section No. 725.154]

725.154 Applications of Listed Class 2, Class 3, and PLTC Cables.

Class 2, Class 3, and PLTC cables shall comply with any of the requirements described in 725.154(A) through (C) and as indicated in Table 725.154.

Table 725.154 Applications of Listed Class 2, Class 3, CMUC, and PLTC Cables in Buildings

Applications		CL2P & CL3P	CL2R & CL3R	Cable Type				
				CL2 & CL3	CL2X & CL3X	CMUC	PLTC	
In ducts specifically fabricated for environmental air as described in 300.22(B)	Exposed to airflow In fabricated ducts	Y*	N	N	N	N	N	
	In metal raceway that complies with 300.22(B)	Y*	Y*	Y*	Y*	N	Y*	
In other spaces used for environmental air (plenums) as described in 300.22(C)	Exposed to airflow In other spaces used for environmental air	Y*	N	N	N	N	N	
	In metal raceway that complies with 300.22(C)	Y*	Y*	Y*	Y*	N	Y*	
	In plenum communications raceways	Y*	N	N	N	N	N	
	In plenum cable routing assemblies	Y*	N	N	N	N	N	
	Supported by open metal cable trays	Y*	N	N	N	N	N	
	Supported by solid bottom metal cable trays with solid metal covers	Y*	Y*	Y*	Y*	N	N	
In risers	In vertical runs	Y*	Y*	N	N	N	N	
	In metal raceways	Y*	Y*	Y*	Y*	N	Y*	
	In fireproof shafts	Y*	Y*	Y*	Y*	N	Y*	
	In plenum communications raceways	Y*	Y*	N	N	N	N	
	In plenum cable routing assemblies	Y*	Y*	N	N	N	N	
	In riser communications raceways	Y*	Y*	N	N	N	N	
	In riser cable routing assemblies	Y*	Y*	N	N	N	N	
		In one- and two-family dwellings	Y*	Y*	Y*	Y*	N	Y*
Within buildings in other than air-handling spaces and risers	General	Y*	Y*	Y*	Y*	N	Y*	
	In one- and two-family dwellings	Y*	Y*	Y*	Y*	Y*	Y*	
	In multifamily dwellings	Y*	Y*	Y*	Y*	Y*	Y*	
	In nonconcealed spaces	Y*	Y*	Y*	Y*	Y*	Y*	
	Supported by cable trays	Y*	Y*	Y*	N	N	Y*	
	Under carpet, modular flooring, and planks	N	N	N	N	Y*	N	
	In cross-connect arrays	Y*	Y*	Y*	N	N	Y*	
	In any raceway recognized in Chapter 3	Y*	Y*	Y*	Y*	N	Y*	

<u>Applications</u>	<u>CL2P & CL3P</u>	<u>CL2R & CL3R</u>	<u>Cable Type</u>			
			<u>CL2 & CL3</u>	<u>CL2X & CL3X</u>	<u>CMUC</u>	<u>PLTC</u>
In plenum communications raceways	Y*	Y*	Y*	N	N	Y*
In plenum cable routing assemblies	Y*	Y*	Y*	N	N	Y*
In riser communications raceways	Y*	Y*	Y*	N	N	Y*
In riser cable routing assemblies	Y*	Y*	Y*	N	N	Y*
In general-purpose communications raceways	Y*	Y*	Y*	N	N	Y*
In general-purpose cable routing assemblies	Y*	Y*	Y*	N	N	Y*

Note: "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 the limitations described in 725.130 through 725.143.

(A) Class 2 and Class 3 Cable Substitutions.

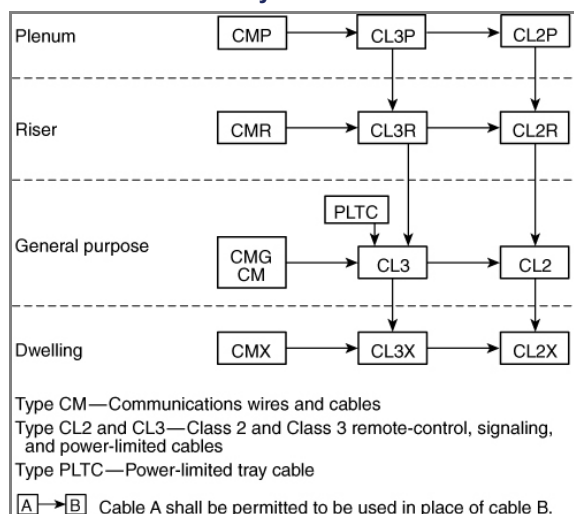
The substitutions for Class 2 and Class 3 cables listed in Table 725.154(A) and illustrated in Figure 725.154(A) shall be permitted. Where substitute cables are installed, the wiring requirements of Article 725, Parts I and III, shall apply.

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

Table 725.154(A) Cable Substitutions

Cable Type	Permitted Substitutions
CL3P	CMP
CL2P	CMP, CL3P
CL3R	CMP, CL3P, CMR
CL2R	CMP, CL3P, CL2P, CMR, CL3R
PLTC	-
CL3	CMP, CL3P, CMR, CL3R, CMG, CM, PLTC
CL2	CMP, CL3P, CL2P, CMR, CL3R, CL2R, CMG, CM, PLTC, CL3
CL3X	CMP, CL3P, CMR, CL3R, CMG, CM, PLTC, CL3, CMX
CL2X	CMP, CL3P, CL2P, CMR, CL3R, CL2R, CMG, CM, PLTC, CL3, CL2, CMX, CL3X

Figure 725.154(A) Cable Substitution Hierarchy.

**(B) Class 2, Class 3, PLTC Circuit Integrity (CI) Cable or Electrical Circuit Protective System.**

Circuit integrity (CI) cable or a listed electrical circuit protective system shall be permitted for use in remote control, signaling, or power-limited systems that supply critical circuits to ensure survivability for continued circuit operation for a specified time under fire conditions.

(C) 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.

Statement of Problem and Substantiation for Public Comment

The term "exposed to airflow" is not defined either on the NEC or in NFPA 90A. There needs to be consistency between the terminology used in the tables for article 725 and those for articles 760, 770 and chapter 8. Note also the comment to PI 136. A parallel PC is being made to article 760.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 500-NFPA 70-2018 [Section No. 760.154]	

Related Item

- fr8945

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**Public Comment No. 1364-NFPA 70-2018 [Section No. 725.179(K)]****(K) Optional Markings.**

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

Informational Note 1 : These markings include, but are not limited to, markings for limited smoke (LS), halogen free (HF), low smoke halogen free (LSHF) and sunlight resistant.

Informational Note 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 Halogen", 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".

Statement of Problem and Substantiation for Public Comment

Panel 3 has accepted as a first revision the inclusion of optional markings, recognizing the widespread use and importance of such markings in conveying relevant information about cable properties to installers and AHJs. Halogen free materials are taking on increasing importance in specialty installations involving spaces with reduced ventilation capabilities such as elevators, subways and the like. Internationally, there are an increasing number of regulations restricting the use of halogenated materials resulting in growing use of halogen free cables and their associated markings. We believe that it is an opportune time to include "halogen free" in the examples given in the existing first revision note.

There is a lot of confusion regarding the terminology, definitions, and tests/standards related to optional markings in common use and /or claims associated with specialty cables. For example, what do "Non – Halogen", "Halogen free", "Low smoke", "HFFR" (halogen free, flame retardant), "LSF0H" (low smoke and fume, zero halogen), "LSF" (low smoke and fume), "LSZH" (low smoke zero halogen), "LSNH" (low smoke non halogen), "LSHF" (low smoke halogen free), "LS0H" (low smoke zero halogen), "0HLS" (zero halogen low smoke), "NHFR" (non-halogen, flame retardant), "HF" (halogen free), "LS" (low/ limited smoke), "FRLS" (fire resistant, low smoke)and "LH" (low halogen) really mean?

Providing a few examples in a second informational note with reference to national and international standards begins to standardize the terminology and avoids misuse and misrepresenting cable markings. These examples make it clear what extra markings of this kind are for and what they mean.

ANSI/UL 13-2018, Power-Limited Circuit Cables, now includes the designations ST1, HF and LSHF with the appropriate standard references after being voted on and accepted by the UL13 Standards Technical Panel (STP).

The proper use of appropriately marked and verified specialty cables enhances safety. Misinformation and misuse leads to a reduction in safety.

Related Item

- FR8937

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**Public Comment No. 506-NFPA 70-2018 [Section No. 725.179(K)]**

~~(K) Optional Markings.~~

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

~~Informational Note: These markings include, but are not limited to, markings for limited smoke and sunlight resistant.~~

Statement of Problem and Substantiation for Public Comment

The code never states that optional items are not permitted. In fact, section 310.120 (D) (now 310.8 (D)) specifically states that optional markings for limited smoke and so on are permitted. This new section is unnecessary and potentially will lead to users loading cables with proprietary information. If this section is retained then similar sections would have to be added to all chapters, for consistency. Note that all similar public inputs to articles in chapters 3 and 4 and in articles under the jurisdiction of CMP 16 were resolved by being rejected without adding language. All panels repeated that it is clear that optional markings are permitted in the NEC.

Related Item

- FR8937

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**Public Comment No. 1188-NFPA 70-2018 [Section No. 727.2]**

727.2 Definition.

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.

Additional Proposed Changes

<u>File Name</u>	<u>Description Approved</u>
CN_157.pdf	70_CN 157

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as CC Note No.157 in the First Draft Report on First Revision No. 8880 and Public Input No. 2236.

The Correlating Committee directs the panel to take action on PI 2236 to correlate with other actions taken throughout the code with respect to the application of definitions in the XXX.2 sections.

This action will be considered as a public comment.

Related Item

• FR 8880 • PI 2236

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Correlating Committee Note No. 157-NFPA 70-2018 [Section No. 727.2]

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Submitter Full Name: Sarah Caldwell

Committee:

Submittal Date: Fri May 11 09:21:25 EDT 2018

Committee Statement and Meeting Notes

Committee Statement: The Correlating Committee directs the panel to take action on PI 2236 to correlate with other actions taken throughout the code with respect to the application of definitions in the XXX.2 sections. This action will be considered as a public comment.

FR-8880-NFPA 70-2018

Ballot Results

✓ **This item has passed ballot**

12 Eligible Voters

0 Not Returned

12 Affirmative All

0 Affirmative with Comments

0 Negative with Comments

0 Abstention

Affirmative All

Brunssen, James E.

Dressman, Kevin L.

Hickman, Palmer L.

Hittinger, David L.

Holub, Richard A.

Johnston, Michael J.

Kovacik, John R.

Manche, Alan

McDaniel, Roger D.

Pierce, James F.

Saporita, Vincent J.

Williams, David A.

**Public Comment No. 2118-NFPA 70-2018 [Section No. 727.2]**

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.

Statement of Problem and Substantiation for Public Comment

The proposed language is part of a global effort to provide guidance to the user of the code regarding applicability of definitions located in the .2 sections within individual articles. The language makes it clear that the definition is not limited to Article 727.

Related Item

- CN 157

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**Public Comment No. 1172-NFPA 70-2018 [Section No. 728.2]**

728.2 Definition.

Fire-Resistive Cable System.

A cable and components used to ensure survivability of critical circuits for a specified time under fire conditions.

Additional Proposed Changes

<u>File Name</u>	<u>Description Approved</u>
CN_158.pdf	70_CN 158

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as CC Note No.158 in the First Draft Report on Public Input No. 2237.

The Correlating Committee directs the panel to take action on PI 2237 to correlate with other actions taken throughout the code with respect to the application of definitions in the XXX.2 sections.

This action will be considered as a public comment.

Related Item

- PI 2237

Submitter Information Verification

Submitter Full Name: CC on NEC-AAC

Organization: NEC Correlating Committee

Street Address:

City:

State:

Zip:

Submittal Date: Fri Aug 24 09:51:07 EDT 2018

Committee: NEC-P03

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Correlating Committee Note No. 158-NFPA 70-2018 [Section No. 728.2]

Submitter Information Verification

Submitter Full Name: Sarah Caldwell

Committee:

Submittal Date: Fri May 11 09:22:14 EDT 2018

Committee Statement and Meeting Notes

Committee Statement: The Correlating Committee directs the panel to take action on PI 2237 to correlate with other actions taken throughout the code with respect to the application of definitions in the XXX.2 sections. This action will be considered as a public comment.

Ballot Results

✓ **This item has passed ballot**

12 Eligible Voters

0 Not Returned

12 Affirmative All

0 Affirmative with Comments

0 Negative with Comments

0 Abstention

Affirmative All

Brunssen, James E.

Dressman, Kevin L.

Hickman, Palmer L.

Hittinger, David L.

Holub, Richard A.

Johnston, Michael J.

Kovacik, John R.

Manche, Alan

McDaniel, Roger D.

Pierce, James F.

Saporita, Vincent J.

Williams, David A.



Public Comment No. 2120-NFPA 70-2018 [Section No. 728.2]

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.

Statement of Problem and Substantiation for Public Comment

The proposed language is part of a global effort to provide guidance to the user of the code regarding applicability of definitions located in the .2 sections within individual articles. The language makes it clear that the definition is not limited to Article 728.

Related Item

- CN 158

Submitter Information Verification

Submitter Full Name: Christel Hunter

Organization: Cerro Wire

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Submittal Date: Thu Aug 30 19:15:16 EDT 2018

Committee: NEC-P03

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**Public Comment No. 356-NFPA 70-2018 [Section No. 728.60]****728.60 Equipment Grounding Conductor .**

Fire-resistive systems installed in a raceway requiring an equipment grounding conductor shall use the same fire-rated cable described in the system, unless alternative equipment grounding conductors are listed with the system. Any alternative equipment grounding conductor 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 cable described in the system.

Statement of Problem and Substantiation for Public Comment

The title improperly uses the term "Grounding", when the proper term is "Equipment Grounding Conductor."

The rule requires "All metal shields, boxes, receptacle housings, and self-contained devices shall be electrically continuous to the equipment grounding conductor of the supplying branch circuit." It does not relate to connecting these parts to the earth.

The definition of "Grounding" (Article 100) is the 'connection to ground' and the definition of 'Ground' (Article 100) is 'The Earth.' So grounding is the connection to the earth.

See FR-8115-NFPA 70-2018 where Code Panel 5 revised the title from 'Grounding' to 'Equipment Grounding Conductor' in 250.148(B). A similar revision here would serve to maintain consistency where applicable throughout the code.

Related Item

- PI-2063

Submitter Information Verification

Submitter Full Name: Mike Holt

Organization: Mike Holt Enterprises Inc

Street Address:

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Zip:

Submission Date: Thu Aug 02 15:46:42 EDT 2018

Committee: NEC-P03

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**Public Comment No. 1173-NFPA 70-2018 [Section No. 760.2]****760.2 Definitions.****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.

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.

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.

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

A fire alarm circuit powered by a source that complies with 760.41 and 760.43.

Power-Limited Fire Alarm Circuit (PLFA).

A fire alarm circuit powered by a source that complies with 760.121.

Additional Proposed Changes

<u>File Name</u>	<u>Description Approved</u>
CN_160.pdf	70_CN 160

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as CC Note No. 160 in the First Draft Report on Public Input No. 1971.

The Correlating Committee directs the panel to take action on PI 1971 to correlate with other actions taken throughout the code with respect to the application of definitions in the XXX.2 sections.

This action will be considered as a public comment.

Related Item

- PI 1971

Submitter Information Verification

Submitter Full Name: CC on NEC-AAC

Organization: NEC Correlating Committee

Street Address:

City:

State:

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Submission Date: Fri Aug 24 09:56:00 EDT 2018

Committee: NEC-P03

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Correlating Committee Note No. 160-NFPA 70-2018 [Section No. 760.2]

Submitter Information Verification

Submitter Full Name: Sarah Caldwell

Committee:

Submittal Date: Fri May 11 09:26:15 EDT 2018

Committee Statement and Meeting Notes

Committee Statement: The Correlating Committee directs the panel to take action on PI 1971 to correlate with other actions taken throughout the code with respect to the application of definitions in the XXX.2 sections. This action will be considered as a public comment.

Ballot Results

✓ **This item has passed ballot**

12 Eligible Voters

0 Not Returned

12 Affirmative All

0 Affirmative with Comments

0 Negative with Comments

0 Abstention

Affirmative All

Brunssen, James E.

Dressman, Kevin L.

Hickman, Palmer L.

Hittinger, David L.

Holub, Richard A.

Johnston, Michael J.

Kovacik, John R.

Manche, Alan

McDaniel, Roger D.

Pierce, James F.

Saporita, Vincent J.

Williams, David A.



Public Comment No. 2122-NFPA 70-2018 [Section No. 760.2]

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.

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.

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.

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

A fire alarm circuit powered by a source that complies with 760.41 and 760.43.

Power-Limited Fire Alarm Circuit (PLFA).

A fire alarm circuit powered by a source that complies with 760.121.

Statement of Problem and Substantiation for Public Comment

The proposed language is part of a global effort to provide guidance to the user of the code regarding applicability of definitions located in the .2 sections within individual articles. The language makes it clear that the definitions are limited to Article 760.

Related Item

- CN 160

Submitter Information Verification

Submitter Full Name: Christel Hunter

Organization: Cerro Wire

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City:

State:

Zip:

Submission Date: Thu Aug 30 19:25:27 EDT 2018

Committee: NEC-P03

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Public Comment No. 114-NFPA 70-2018 [Sections 760.3(L), 760.3(M)]

Sections 760.3(L), 760.3(M)

(L) Cable Routing Assemblies.

Power-limited fire alarm 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 805.800.154(c b), listed in accordance with the provisions of 805.800.182, and installed in accordance with 805.800.110(C) and 805.800.113.

(M) Communications Raceways.

Power-limited fire alarm cables shall be permitted to be installed in plenum communications raceways, riser communications raceways, and general-purpose communications raceways selected in accordance with Table 805.800.154(b a), listed in accordance with the provisions of 805.800.182, and installed in accordance with 805.800.113 and 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.

Statement of Problem and Substantiation for Public Comment

This PC coordinates with PC 61 which moves the listing, applications and installation rules for communications raceways, and cable routing assemblies from Article 805 (formerly Article 800) into new general Article 800.

Related Public Comments for This Document

Related Comment

Public Comment No. 113-NFPA 70-2018 [Sections 725.3(M), 725.3(N)]

Public Comment No. 113-NFPA 70-2018 [Sections 725.3(M), 725.3(N)]

Relationship

Coordinating PC for Article 725

Related Item

- FR 7512

Submitter Information Verification

Submitter Full Name: Terry Peters

Organization: PLASTICS Industry Association

Affiliation: PLASTICS Industry Association

Street Address:

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Submittal Date: Sat Jun 30 09:28:27 EDT 2018

Committee: NEC-P03

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**Public Comment No. 1948-NFPA 70-2018 [New Section after 760.3(N)]**(O). Identification of Equipment Grounding Conductors .

Section 250.119, Identification of Equipment Grounding Conductors, shall not apply to Types FPLP, FPLR, FPL and substitute cables installed in accordance with 760.154(A).

Informational Note: The green wires in power-limited fire alarm cables and communications cables are signal wires, not ground wires.

Statement of Problem and Substantiation for Public Comment

The issue is the inadvertent grounding of communications cables used by fire alarm systems and those circuits within the scope of Article 760. In the last three years, systems operating at 60 VDC have been introduced into the Code, operating above the threshold value listed within the exemption present in 250.119 concerning grounding and use of a green conductor.

While resolution should occur within Art 250.119 and CMP5, making a change here in response to PI 1743 lowers risk of improper installation leading to system failure. While fire alarm systems have additional requirements per NFPA 72 and other codes and standards which should provide for the detection of improper installation prior to operation, addition of this text here assists in lowering the potential that an installation issue goes undetected until system failure.

For reference:

Public Input No. 1743 for 250.119 recommended exempting all Class 2, Class 2 and communications cables from the requirement to ground the green wires.

The substantiation for PI 1743 states:

“Class 2, Class 3, power-limited fire alarm and communications cables all have a color code that includes green wires. These green wires are not intended for grounding; they are signal wires. It is inappropriate to limit the voltage to 50 volts as contained in the original text. Class 2 and Class 3 circuits may operate at voltages exceeding 50 volts. Introduction of Power over Ethernet (PoE) requirements into the NEC 2017 Edition permits a voltage of 60 volts on communications conductors. References to specific sections of Articles 725, 760 and 800 are added to clarify the application of Exception No. 1.”

PI 1743 was resolved with the statement:

“No technical substantiation has been provided to raise the threshold above 50 volts.”

Section 90.3 Code Arrangement, permits Chapter 7 to supplement or modify the requirements of Chapters 1 through 4. The recommended text of this Public Comment implements the recommendation of PI 1743 by modifying the requirements of 250.119 as permitted by 90.3.

Related Item

- PI 1743

Submitter Information Verification

Submitter Full Name: Jeff Silveira

Organization: Bicsi

Street Address:

City:

State:

Zip:

Submission Date: Thu Aug 30 12:57:29 EDT 2018

Committee: NEC-P03

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Public Comment No. 512-NFPA 70-2018 [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 straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4(D). Metallic means of support for flexible conduit and conductors shall be used in spaces above egress, which includes doorways, hallways, stairways, corridors, passageways, lobbies, landings, and equivalent spaces.

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 760.53(A)(1) and 760.130(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.

Statement of Problem and Substantiation for Public Comment

The panel rejected PI 3233 on article 725 because it was not provided to all corresponding sections. This public comment is being submitted to article 725 and to articles 760 (in this PC), 770 and 805 (in other PCs). The submitter of PI 3233 is correct in stating that "Nonmetallic supports exhibit significant weakening and failure during fires which can affect the safety of occupants and emergency personnel entering and exiting buildings due to entanglement in fallen cable." There are abundant examples of firefighters getting trapped under mazes of cables falling as a result of inadequate supports (perhaps because they burnt or because they lost strength during a fire). I will not repeat here all the information provided by the original submitted but will include the bibliography, as follows:

- [1] Fire Engineering Training Minutes. Presented by Mike Ciampo, Fire Department of New York.
<http://www.fireengineering.com/topics/m/video/36928837/the-quick-release-method.htm?q=cable+entanglement>
- [2] Chubb, M., and Joe Caldwell. 3/1/1995. "Tragedy in a Residential High-Rise, Memphis, Tennessee." Fire Engineering, <http://www.fireengineering.com/articles/print/volume-148/issue-3/features/tragedy-in-a-residential-high-rise-memphistennessee.html>
- [3] April 15, 2013. "Shirley Towers flats blaze: 'Possible safety breaches'". BBC. <http://www.bbc.co.uk/news/uk-englandhampshire-22126431>
- [4] Rawlinson, J. August 2014, Vol. 34, No. 8, "Change for the Better." Electrical Contracting News (ECN), pp. 24-25.
<http://edition.pagesuiteprofessional.co.uk/Launch.aspx?EID=dd8a7ebe-4f8b-4aa6-a9a1-d6b4692f6a23>
- [5] BS 7671:2008+A2:2013, Requirements for electrical installations. IET Wiring Regulations. Seventeenth edition.
- [6] BS 5839-1:2013, Fire detection and fire alarm systems for buildings. Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 513-NFPA 70-2018 [Section No. 770.24]	
Public Comment No. 514-NFPA 70-2018 [Section No. 805.24]	
<u>Related Item</u>	
• PI 3233	

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler
Organization: GBH International

Street Address:**City:****State:****Zip:****Submittal Date:** Thu Aug 09 17:57:51 EDT 2018**Committee:** NEC-P03**Copyright Assignment**

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**Public Comment No. 1496-NFPA 70-2018 [Section No. 760.24(A)]****(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 straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4(D).

Informational Note: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants might result in an undetermined alteration of PLFA and NPLFA cable properties.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
FR8883_760.24_A_300.4_4971_.docx	Public Comment in support of FR 8883.	

Statement of Problem and Substantiation for Public Comment

The reference in 760.24(A) is changed from 300.4(D) to 300.4.

Committee Statement. CMP3 has been made aware of issues in the field regarding damage to fire alarm cables during installation. The reference to 300.4(D) was expanded to 300.4 because fire alarm circuits are subjected to the same danger of physical harm as Chapter 3 Wiring methods.

Five (5) Public Inputs were submitted proposing changes for fire alarm (FA) installations and the physical protection of its associated cables for the 2020 NEC. First Revision (FR) No. 8883 is a result of those PI's and the efforts of CMP3 to provide that the full requirements of 300.4 apply to the installations of FA cabling.

Currently FA installations need to comply with 300.4(D) only.

FA cabling can be installed in locations outside of the protections required by 300.4(D) alone. Requiring that all the physical protections found in 300.4 for non-critical systems, be required for a critical system such as FA, provides the additional 'integrity' needed for both proper and 'trouble' free FA operation. (B)(1) and (B)(2) apply to

Non-Metallic Sheathed Cable and Electric Non-Metallic Tubing only and would not apply to a FA system's cabling.

(G) only applies to conductors #4 AWG and larger and would most likely not apply to FA cables. FA cables are subjected to the same 'physical damage' as other wiring methods and in particular cable systems. Several of the PI's submitted proposing changes to 760.24(A) called attention to the damage suffered by FA cables in the field during the construction process of buildings. Photographs have been included documenting this damage to FA cabling. (see attachments) Fire alarm cabling installation is governed by the requirements of the NEC, Article 760, the remainder of the installation by NFPA 72. Any change for the requirements for the installation of fire alarm cables should come from the NEC. CMP3 in recognizing the importance of the integrity and reliability of FA systems in protecting the public has expanded the protection requirements for the cabling that allows these systems to perform in the event of an emergency. Recent events have illustrated that these systems will fail to perform when exposed to physical damage or if installed in a manner that does not ensure protection from physical damage.

Related Item

- FR8883

Submitter Information Verification

Submitter Full Name: Michael Farrell III

Organization: Lucas County Building Regulati

Affiliation: IBEW

Street Address:

City:

State:

Zip:

Submission Date: Wed Aug 29 08:18:53 EDT 2018

Committee: NEC-P03

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First Revision No. 8883

The reference in 760.24(A) is changed from 300.4(D) to 300.4.

Committee Statement. CMP3 has been made aware of issues in the field regarding damage to fire alarm cables during installation. The reference to 300.4(D) was expanded to 300.4 because fire alarm circuits are subjected to the same danger of physical harm as Chapter 3 Wiring methods.

Five (5) Public Inputs were submitted proposing changes for fire alarm (FA) installations and the physical protection of its associated cables for the 2020 NEC. First Revision (FR) No. 8883 is a result of those PI's and the efforts of CMP3 to provide that the full requirements of 300.4 apply to the installations of FA cabling.

Currently FA installations need to comply with 300.4(D) only.

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 straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4(D).

300.4 Protection Against Physical Damage. Where subject to physical damage, conductors, raceways, and cables shall be protected.

D) Cables and Raceways Parallel to Framing Members and Furring Strips. In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed parallel to framing members, such as joists, rafters, or studs, or is installed parallel to furring strips, the cable or raceway shall be installed and supported so that the nearest outside surface of the cable or raceway is not less than 32 mm (1 1/4 in.) from the nearest edge of the framing member or furring strips where nails or screws are likely to penetrate. Where this distance cannot be maintained, the cable or raceway shall be protected from penetration by nails or screws by a steel plate, sleeve, or equivalent at least 1.6 mm (1/16 in.) thick.

FA cabling can be installed in locations outside of the protections required by 300.4(D) alone. Requiring that all the physical protections found in 300.4 for non-critical systems, be required for a critical system such as FA, provides the additional 'integrity' needed for both proper and 'trouble' free FA operation. (B)(1) and (B)(2) apply to Non-Metallic Sheathed Cable and Electric Non-Metallic Tubing only and would not apply to a FA system's cabling. (G) only applies to conductors #4 AWG and larger and would most likely not apply to FA cables.

(A) Cables and Raceways Through Wood Members.

(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 (11/4 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 (1/16 in.) thick, and of appropriate length and width installed to cover the area of the wiring.

(2) Notches in Wood. Where there is no objection because of weakening the building structure, in both exposed and concealed locations, cables or raceways shall be permitted to be laid in notches in wood studs, joists, rafters, or other wood members where the cable or raceway at those points is protected against nails or screws by a steel plate at least 1.6 mm (1/16 in.) thick, and of appropriate length and width, installed to cover the area of the wiring. The steel plate shall be installed before the building finish is applied.

(C) Cables Through Spaces Behind Panels Designed to Allow Access. Cables or raceway-type wiring methods, installed behind panels designed to allow access, shall be supported according to their applicable articles.

E) Cables, Raceways, or Boxes Installed in or Under 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 (11/2 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.

(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 (1/16 in.) thick steel plate, sleeve, or equivalent or by not less than 32-mm (1 1/4-in.) free space for the full length of the groove in which the cable or raceway is installed.

(H) Structural Joints. A listed expansion/deflection fitting or other approved means shall be used where a raceway crosses a structural joint intended for expansion, contraction or deflection, used in buildings, bridges, parking garages, or other structures.

Conditions found in 300.4 (A), (C), (E), (F), and (H) have protection requirements warranted for FA cables in addition to those already required by (D).

Substantiation

FA cables are subjected to the same 'physical damage' as other wiring methods and in particular cable systems. Several of the PI's submitted proposing changes to 760.24(A) called attention to the damage suffered by FA cables in the field during the construction process of buildings. Photographs have been included documenting this damage to FA cabling. (see attachments below)

PI 487 I have repaired many fire alarm circuits that were damaged by roofing screws. (Please see photos) When the screws penetrate the wiring method it can cause various malfunctions on the fire alarm system, including short circuits, open circuits or ground faults. These malfunctions have caused smoke detectors to stop working, audio/visual evacuation appliance circuits to fail, and other fire alarm circuits to be compromised. These failures put every occupant of the building in jeopardy if the fire alarm equipment fails during a real emergency. The same protection should be required for these life safety circuits that is required for lighting and power circuits. This revision will help make that happen

PI 1888 The rules in 300.4(E) and (F) provide protection from damage for many non-critical systems. Article 760 does not currently require that the fire alarm system wiring have the protection that is required by 300.4(E) and (F) for non-critical systems. This change extends those protective requirements to the fire alarm system wiring.

PI 1931 Fire alarm systems are essential to life safety and need to be operational without failure at all times. The present physical protection requirements of fire alarm cables are only concerned with mechanical protection where parallel to framing members. These life safety components need the same level of protection for bored holes, roof decking, shallow grooves, expansion joints and metal framing members as for bored holes. There is no rationale to limit protection to only parallel framing members.

PI 2173 760.24 already states that cables shall be installed so they are not damaged. 300.4 is a minimum standard for protection on cables from physical damage. Although modern fire alarm cables are power limited, when they are damaged, life safety systems are taken out of service. In the case of an addressable system, a short can disable an entire area of the building. In the case of a conventional system, nuisance alarms will result, training the occupants to ignore alarms.

[PI 2263](#) Fire alarm cables and raceways need be required to have additional protection under roof decking surfaces. The installation of roof surfaces on existing buildings may expose the fire alarm system to inadvertent penetration from roof deck screws.

NEC Article 760 Fire Alarm Systems

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 further information on the installation and monitoring for integrity requirements for fire alarm systems, refer to the *NFPA 72 –2013, National Fire Alarm and Signaling Code*.

NFPA 72 National Fire Alarm and Signaling Code

1.1 Scope.

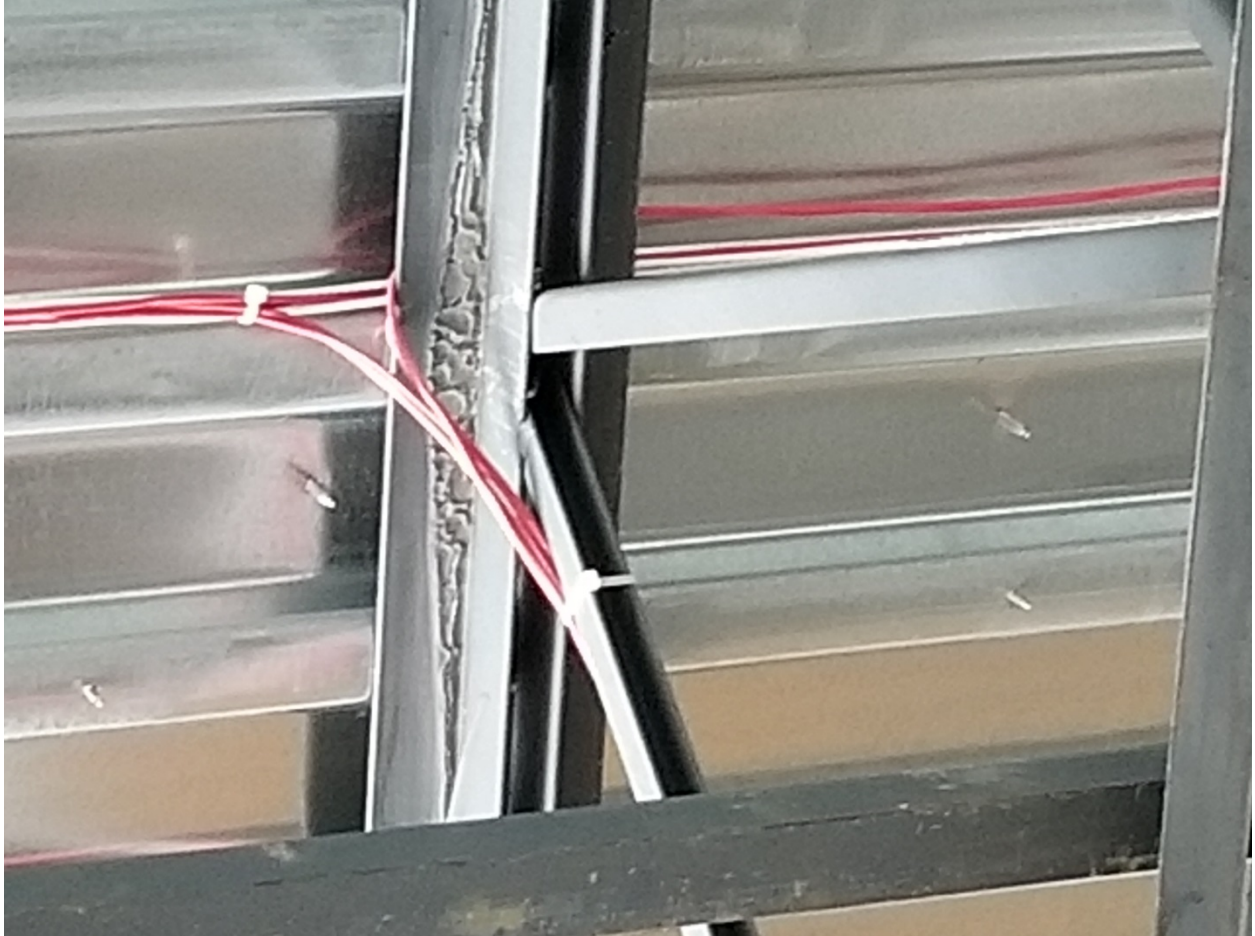
1.1.1 NFPA 72 covers the application, installation, location, performance, inspection, testing, and maintenance of the fire alarm systems, supervising station alarm systems, public emergency alarm reporting systems, fire warning equipment and emergency communications systems (ECS) and their components.

Fire alarm cabling installation is governed by the requirements of the NEC, Article 760, the remainder of the installation by NFPA 72. Any change for the requirements for the installation of fire alarm cables should come from the NEC. CMP3 in recognizing the importance of the integrity and reliability of FA systems in protecting the public has expanded the protection requirements for the cabling that allows these systems to perform in the event of an emergency. Recent events have illustrated that these systems will fail to perform when exposed to physical damage or if installed in a manner that does not ensure protection from physical damage.

Attachments (Photograph Documentation)

Illustrates FA cable subject to physical damage from roof decking screw fasteners. Compliance with 300.4(E) would prohibit the installation of FA cables in this location.



















**Public Comment No. 1751-NFPA 70-2018 [Section No. 760.24(A)]****(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 straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4(D) -

Informational Note: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants might result in an undetermined alteration of PLFA and NPLFA cable properties.

Statement of Problem and Substantiation for Public Comment

Physical damage may result no matter which orientation cable are run and should be protected no matter what. This is being submitted along with a PC on article 800.24 to CMP-16 so that correlating actions may be taken as a result of FR-8883, acted on in the first draft.

Related Item

- FR-8883

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**Public Comment No. 601-NFPA 70-2018 [Section No. 760.24(A)]****(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 straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4(D) .

Informational Note: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants might result in an undetermined alteration of PLFA and NPLFA cable properties.

Statement of Problem and Substantiation for Public Comment

Reference to (D) needs to be dropped, so all of the 300.4 requirements apply.

Statement made on FR 8883, CMP 3 has become aware of issues in the field regarding damage to fire alarm cables during installation. The reference to 300.4(D) was expanded to 300.4 because fire alarm circuits are subjected to the same danger of physical harm as Chapter 3 wiring methods.

Related Item

- FR 8883

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**Public Comment No. 59-NFPA 70-2018 [New Section after 760.35]****TITLE OF NEW CONTENT**

760.36 Surge Protection. A listed surge protective device shall be installed in or on the fire alarm control panel.

Statement of Problem and Substantiation for Public Comment

As substantiation for the NEMA proposal (PI 2701, Article 760.36, CMP 3), the information obtained from a NEMA conducted study on surge susceptibility of various equipment is provided here to demonstrate the susceptibility of equipment used in association with fire alarm control panels. Portions of the NEMA Whitepaper on Susceptibility of Electrical and Electronic Components to Surge Damage are included for your review.

"The purpose of this paper is to present the test results of actual devices in a real-world surge environment. This white paper will generate some information on the surge susceptibility for various electrical components...The results obtained by this testing can be used as a guide to the reaction of electrical devices under various conditions. Some devices might show malfunctions and some may experience upset events caused by surge events in actual installations."

As an example, a 50 VA Control transformer was tested. This equipment is representative of control transformers that may be used in fire alarm control panels. Testing was conducted using IEEE standard C62.41 waveforms, A 6 kV /3 kA impulse wave, which may be considered under some circumstances to be a catastrophic event, was used. When subjected to this test waveform, the 50 VA control transformer only withstood a single impulse. When subjected to a ringing impulse of Category B (6000 V/500 A) ringing impulse, specified by IEEE as representing surges inside buildings, the equipment withstood 53 impulses. It is expected that the lifetime exposure would be much higher than the 53 impulses as referenced in IEEE C62.45. Since most fire alarm systems operate with a conversion transformer stepping voltage down from 120 Volts to 24 Volts, this 50VA control transformer testing demonstrates the susceptibility of fire alarm control panels.

As highlighted in the NEMA Whitepaper on Susceptibility of Electrical and Electronic Components to Surge Damage, "Electrical equipment is subject to surge damage and these results show conclusively that everyday electrical devices are damaged by surges of the level expected in a normal electrical distribution system. The application of a surge protective device (SPD) within a home or facility can alleviate the effects and save the cost or replacement for many electrical or electronic devices."

- In addition to Fire alarm control panel, there are many power boosters that are used to supply power to network
- As Fire Alarm and Mass Notification systems require per NFPA 72 chapter 14 Inspection test and maintenance of an approved system (annually). Knowing that UL does do extensive testing in UL 864 for control panels it is understood that MOVs used in panels for surge protection will degrade overtime and with the severity of the power conditions the unit will fail without any way to know when or prevent the failure. It is suggested best practice that a surge device should be inspected yearly and changed every 5 years to ensure proper protection to a life safety system FACP and supporting power boosters.
- UL 497B Protectors for Data Communications and Fire-Alarm Circuits was revised December 2012 reaffirming ANSI approval of this Standard. This document provides requirements for protectors used in fire alarm circuits. These "protectors are intended to protect the equipment and wiring against the effects of excessive potentials and currents caused by lightning." This UL safety standard recognizes the need to protect fire alarm circuits. The above supports the addition of the proposed public input, "760.36 Surge Protection A listed surge protective device shall be installed in or on the fire alarm control panel".

Related Item

- PT 2701

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Public Comment No. 500-NFPA 70-2018 [Section No. 760.154]

760.154 Applications of Listed PLFA Cables.

PLFA cables shall comply with the requirements described in Table 760.154 or where cable substitutions are made as shown in 760.154(A). Where substitute cables are installed, the wiring requirements of Article 760, Parts I and III, shall apply. Types FPLP-CI, FPLR-CI, and FPL-CI cables shall be permitted to be installed to provide 2-hour circuit integrity rated cables.

Table 760.154 Applications of Listed PLFA Cables in Buildings

<u>Applications</u>		<u>FPLP & FPLP-CI</u>	<u>FPLR & FPLR-CI</u>	<u>Cable Type</u>	
				<u>FPL & FPL-CI</u>	
In ducts specifically fabricated for environmental air as described in 300.22(B)	~~Exposed to airflow~~ <u>In fabricated ducts</u>	Y*	N	N	
	In metal raceway that complies with 300.22(B)	Y*	Y*	Y*	
In other spaces used for environmental air (plenums) as described in 300.22(C)	~~Exposed to airflow~~ <u>In other spaces used for environmental air</u>	Y*	N	N	
	In metal raceway that complies with 300.22(C)		Y*	Y*	Y*
	In plenum communications raceways		Y*	N	N
	In plenum cable routing assemblies		Y*	N	N
	Supported by open metal cable trays		Y*	N	N
	Supported by solid bottom metal cable trays with solid metal covers		Y*	Y*	Y*
In risers	In vertical runs	Y*	Y*	N	
	In metal raceways		Y*	Y*	Y*
	In fireproof shafts		Y*	Y*	Y*
	In plenum communications raceways		Y*	Y*	N
	In plenum cable routing assemblies		Y*	Y*	N
	In riser communications raceways		Y*	Y*	N
	In riser cable routing assemblies		Y*	Y*	N
	In one- and two-family dwellings		Y*	Y*	Y*
Within buildings in other than air-handling spaces and risers	General	Y*	Y*	Y*	
	Supported by cable trays	Y*	Y*	Y*	
	In any raceway recognized in Chapter 3	Y*	Y*	Y*	
	In plenum communications raceway	Y*	Y*	Y*	
	In plenum cable routing assemblies	Y*	Y*	Y*	
	In riser communications raceways	Y*	Y*	Y*	
	In riser cable routing assemblies	Y*	Y*	Y*	
	In general-purpose communications raceways	Y*	Y*	Y*	

<u>Applications</u>	<u>FPLP & FPLP-CI</u>	<u>FPLR & FPLR-CI</u>	<u>Cable Type</u>
			<u>FPL & FPL-CI</u>
In general-purpose cable routing assemblies	Y*	Y*	Y*

Note:

"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 the limitations described in 760.130 through 760.145.

(A) Fire Alarm Cable Substitutions.

The substitutions for fire alarm cables listed in Table 760.154(A) and illustrated in Figure 760.154(A) shall be permitted. Where substitute cables are installed, the wiring requirements of Article 760, Parts I and III, shall apply.

Informational Note: For information on communications cables (CMP, CMR, CMG, CM), see 805.179.

Figure 760.154(A) Cable Substitution Hierarchy.

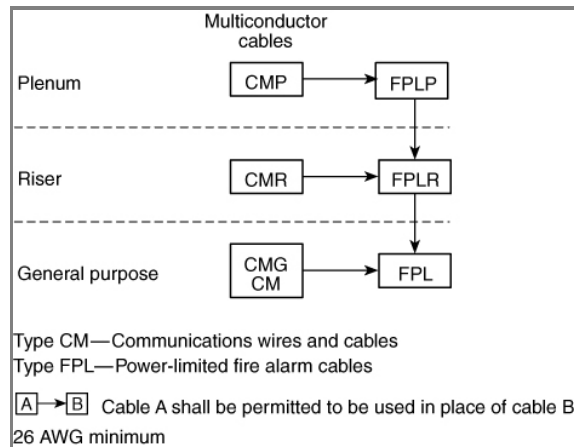


Table 760.154(A) Cable Substitutions

<u>Cable Type</u>	<u>Permitted Substitutions</u>
FPLP	CMP
FPLR	CMP, FPLP, CMR
FPL	CMP, FPLP, CMR, FPLR, CMG, CM

Statement of Problem and Substantiation for Public Comment

The term "exposed to the airflow" is not defined and the parallel tables in article 770 and chapter 8 all retained the original language. Note also the committee statement for the FR and for PI 127.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 501-NFPA 70-2018 [Section No. 725.154]	
<u>Related Item</u>	
• FR8950	

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Public Comment No. 2117-NFPA 70-2018 [Section No. Table]

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(B)

Table 11(A) and Table 11(B)

For listing purposes, Table 11(A) and Table 11(B) provide the required power source limitations for Class 2 and Class 3 power sources. Table 11(A) applies for alternating-current sources, and Table 11(B) applies for direct-current sources.

The power for Class 2 and Class 3 circuits shall be either (1) inherently limited, requiring no overcurrent protection, or (2) not inherently limited, requiring a combination of power source and overcurrent protection. Power sources designed for interconnection shall be listed for the purpose.

As part of the listing, the Class 2 or Class 3 power source shall be durably marked where plainly visible to indicate the class of supply and its electrical rating. A Class 2 power source not suitable for wet location use shall be so marked.

Exception: Limited power circuits used by listed information technology equipment.

Overcurrent devices, where required, shall be located at the point where the conductor to be protected receives its supply and shall not be interchangeable with devices of higher ratings. The overcurrent device shall be permitted as an integral part of the power source.

The direct-current limits in Table 11(B) apply to continuous DC as well as DC that is delivered in pulses, bursts, packets, or other intermittent method. If non-continuous, the effective maximum values of current and power that power source can deliver shall be used to determine conformance with Table 11(B).

Table 11(A) Class 2 and Class 3 Alternating-Current Power Source Limitations

<u>Power Source</u>		<u>Inherently Limited Power Source (Overcurrent Protection Not Required)</u>				<u>Not Inherently Limited Power Source (Overcurrent Protection Required)</u>		
		<u>Class 2</u>		<u>Class 3</u>		<u>Class 2</u>		<u>Class 3</u>
Source voltage $V_{\max}$ (volts) (see Note 1)		0 through 20*	Over 20 and through 30*	Over 30 and through 150	Over 30 and through 100	0 through 20*	Over 20 and through 30*	Over 30 and through 100 Over 100 and through 150
Power limitations $VA_{\max}$ (volt-amperes) (see Note 1)		—	—	—	—	250 (see Note 3)	250	250 N.A.
Current limitations $I_{\max}$ (amperes) (see Note 1)		8.0	8.0	0.005	$150/V_{\max}$	$1000/V_{\max}$	$1000/V_{\max}$	$1000/V_{\max}$ 1.0
Maximum overcurrent protection (amperes)		—	—	—	—	5.0	$100/V_{\max}$	$100/V_{\max}$ 1.0
Power source maximum nameplate rating	VA (volt-amperes)	$5.0 \times V_{\max}$	100	$0.005 \times V_{\max}$	100	$5.0 \times V_{\max}$	100	100 100
	Current (amperes)	5.0	$100/V_{\max}$	0.005	$100/V_{\max}$	5.0	$100/V_{\max}$	$100/V_{\max}$ $100/V_{\max}$

Note: Notes for this table can be found following Table 11(B).

*Voltage ranges shown are for sinusoidal ac in indoor locations or where wet contact is not likely to occur. For nonsinusoidal or wet contact conditions, see Note 2.

Table 11(B) Class 2 and Class 3 Direct-Current Power Source Limitations

<u>Power Source</u>		<u>Inherently Limited Power Source (Overcurrent Protection Not Required)</u>				<u>Not Inherent Limited Pow Source (Overcurrer Protection Required)</u>		
		<u>Class 2</u>		<u>Class 3</u>		<u>Class 2</u>		<u>Class 3</u>

Power Source			Inherently Limited Power Source (Overcurrent Protection Not Required)					Not Inherent Limited Power Source (Overcurrent Protection Required)	
			Class 2		Class 3	Class 2		Class 3	
Source voltage V_{max} (volts) (see Note 1)	0 through 20*	Over 20 and through 30*	Over 30 and through 60*	Over 60 and through 150	Over 60 and through 100	0 through 20*	Over 20 and through 60*	Over 60 and through 100	Over and through 150
Power limitations VA_{max} (volt-amperes) (see Note 1)	—	—	—	—	—	250 (see Note 3)	250	250	N.
Current limitations I_{max} (amperes) (see Note 1)	8.0	8.0	$150/V_{max}$	0.005	$150/V_{max}$	$1000/V_{max}$	$1000/V_{max}$	$1000/V_{max}$	1
Maximum overcurrent protection (amperes)	—	—	—	—	—	5.0	$100/V_{max}$	$100/V_{max}$	1
Power source maximum nameplate rating	VA (volt-amperes)	$5.0 \times V_{max}$	100	100	$0.005 \times V_{max}$	100	$5.0 \times V_{max}$	100	100
	Current (amperes)	5.0	$100/V_{max}$	$100/V_{max}$	0.005	$100/V_{max}$	5.0	$100/V_{max}$	$100/V_{max}$

*Voltage ranges shown are for continuous dc in indoor locations or where wet contact is not likely to occur. For interrupted dc or wet contact conditions, see Note 4.

Notes for Table 11(A) and Table 11(B)

1. V_{max} , I_{max} , and VA_{max} are determined with the current-limiting impedance in the circuit (not bypassed) as follows:

V_{max} : Maximum output voltage regardless of load with rated input applied.

I_{max} : Maximum output current under any noncapacitive load, including short circuit, and with overcurrent protection bypassed if used. Where a transformer limits the output current, I_{max} limits apply after 1 minute of operation. Where a current-limiting impedance, listed for the purpose, or as part of a listed product, is used in combination with a non-power-limited transformer or a stored energy source, e.g., storage battery, to limit the output current, I_{max} limits apply after 5 seconds.

VA_{max} : Maximum volt-ampere output after 1 minute of operation regardless of load and overcurrent protection bypassed if used.

2. For nonsinusoidal ac, V_{max} shall not be greater than 42.4 volts peak. Where wet contact (immersion not included) is likely to occur, Class 3 wiring methods shall be used or V_{max} shall not be greater than 15 volts for sinusoidal ac and 21.2 volts peak for nonsinusoidal ac.

3. If the power source is a transformer, VA_{max} is 350 or less when V_{max} is 15 or less.

4. For dc interrupted at a rate of 10 to 200 Hz, V_{max} shall not be greater than 24.8 volts peak. Where wet contact (immersion not included) is likely to occur, Class 3 wiring methods shall be used, or V_{max} shall not be greater than 30 volts for continuous dc; 12.4 volts peak for dc that is interrupted at a rate of 10 to 200 Hz.

Statement of Problem and Substantiation for Public Comment

This clarification was originally provided in Public Input No. 4015-NFPA 70-2017. The rationale in the response, indicates that the concern and rationale for the PI was mis-understood. This clarification is not due to an electrical shock hazard concern, but rather a "cable fire issue". There are at least two manufacturers who are claiming that the values in Table 11b do not apply to power sources that use pulsed or packetized bursts of DC power on Class 2/3 and communications cables. Table 11b is for continuous DC and also has provisions in the notes for 10Hz to 200Hz pulsed DC. In one case the products frequency of the DC Bursts is in the 700Hz Range, so it outside the

ranges covered in the Table and note.

To be clear this is not a shock issue and it may be perfectly safe to the touch. However, they are advertising wattages up to effectively 2400 watts on one pair of a LAN/Ethernet cable, with effectively 7+ amps at over 300V peak. Powering HVAC to refrigerators to lighting. But because the marketing claim is that there are no limits for Pulsed/packetized DC at 700 Hz, the values in Table 11b do not apply.

This clarification text is needed in sections 725.121, 840.170, and Table 11b. in order to clarify that technologies are not exempt from the values in Table 11b by using loopholes or mis-interpretation or naming their electrical outputs by some new name. One of these companies claims in public videos that they have deployments of this type in over 400 public locations including commercial buildings and sports stadiums.

Related Item

• Public Input No. 4015-NFPA
70-2017

• Public Input No. 3986-NFPA
70-2017

• Public Input No. 3992-NFPA
70-2017

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**Public Comment No. 840-NFPA 70-2018 [Section No. 110.12(B)]****(B) Integrity of Electrical Equipment and Connections.**

Internal parts of electrical equipment, including busbars, wiring terminals, insulators, and other surfaces, shall not be damaged or contaminated by foreign materials such as paint, plaster, cleaners, abrasives, or corrosive residues. There shall be no damaged parts that may adversely affect safe operation or mechanical strength of the equipment such as parts that are broken; bent; cut; or deteriorated by corrosion, chemical action, or overheating.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
CN_135.pdf	70_CN 135	✓

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as CC Note No.135 in the First Draft Report on First Revision No. 8484.

It was the action of the Correlating Committee that this first revision be referred to Code-Making Panel 3 and Panel 16 for correlation with this first revision.

This action will be considered as a public comment.

Related Item

- FR 8484

Submitter Information Verification

Submitter Full Name: CC on NEC-AAC

Organization: NEC Correlating Committee

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Submittal Date: Mon Aug 20 11:44:13 EDT 2018

Committee: NEC-P03

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Submitter Information Verification

Committee:

Committee Statement and Meeting Notes

This action will be considered as a public comment.

First Revision No. 8484-NFPA 70-2018 [New Section after 110.12(B)]

Ballot Results

0 Not Returned

0 Affirmative with Comments

1 Negative with Comments

0 Abstention

Affirmative All

Williams, David A.

Negative with Comment

Relocation of mechanical execution of work requirements from 800.24, 820.24 and 830.24 to 110.12(C) [New] is unnecessary and inappropriate. The NEC Correlating Committee accepted the action of Panel 16

to create a new Chapter 8 general article in response to Public Input from the Correlating Committee Task Group to address redundant requirements in Chapter 8 (PI 2858) and accepted First Revision FR 7512 by Panel 16 resulting in proposed general Article 890. The Correlating Committee further solidified this position by directing Panel 16 to renumber the new general article as Article 800 and renumber the present Article 800 as Article 805. The proposed new Article 800, General Requirements for Communications Systems, contains mechanical execution of work requirements in Section 800.24. Having redundant mechanical execution of work requirements in Section 110.12(C) does not fulfill the objective of the Correlating Committee-appointed Task Group to simplify redundant requirements. NEC usability is better served by locating the mechanical execution of work requirements in new general Article 800 as shown in the First Draft Report. This will closely associate these requirements to the NEC sections to which they pertain facilitating usability. Communications systems NEC users are more likely to review these requirements when located in Article 800 than when remotely located in Article 110.12(C).