

# Tentative Interim Amendment (TIA) Request Form

## Submitter's Information

Name: Click here to enter text.

Affiliation: (Technical Committee, company, organization): Click here to enter text.

Address: Click here to enter text.

City: Enter City.

State: Enter State

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Email Address: Click here to enter text.

Date: Click here to enter a date.

## Proposed TIA Information

NFPA Standard No.: 70

Editions affected (Current and/or Proposed): 2017

**Proposed text of the TIA (wording to be added, revised, how to be revised, or deleted):** [Note: Proposed text should be in legislative format; i.e., use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (~~deleted wording~~).]

**Proposed text of the TIA (wording to be added, revised, how to be revised, or deleted):**

### Section 725.2 Definitions

Insert the following new definition and Informational Note.

**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 supplies current over 2 or 4 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.

**Section 725.121(C) Marking.** The power sources for limited power circuits in 725.121(A)(3) and limited power circuits for listed audio/video information technology (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 for each connection point. Where multiple connection points have the same rating, a single label shall be permitted to be used. The effective date shall be January 1, 2018.

Exception: Marking shall not be required for power sources providing 0.3 amperes nominal current or less per conductor.

### Section 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 following shall apply, as applicable:~~ (1) ~~The~~ the ampacity ratings in Table 725.144 shall apply to the nominal current at an ambient temperature of 30°C (86°F). (2) ~~For~~ ambient temperatures above 30°C (86°F), the correction factors of 310.15(B)(2) shall apply.

Exception: Compliance with Table 725.144 shall not be required for installations where the nominal current does not exceed 0.3 amperes in any conductor.

#### Statement of the problem and substantiation for the TIA

Section 725.144, which covers using data cables to deliver power to a device in addition to transmitting data, was introduced into the 2017 Code to cover Power over Ethernet (PoE) and other similar powering schemes.

The Committee Statement for Second Revision No. 611 was rather succinct. It states, “The new section 725.144 and the accompanying table has been added based upon the *UL Fact Finding Report on Power over Local Area Network Type Cables (4-Pair Data / Communications Cables)* with additionally an introduction to new cable type LP that provides the current limitation due to cable bundling and some other installation considerations for power over Ethernet”.

The Fact Finding Report cited in the Committee Statement is *UL Fact Finding Report on Power over Local Area Network Type Cables (4-Pair Data / Communications Cables)* (<http://www.plasticsindustry.org/sites/plastics.dev/files/SPI%20Fact%20Finding%20Report%20%28Issued%202015-09-25%29%2BErrata%201%C2%A9UL%26SPI.pdf>). The Fact Finding Report clearly shows there are no overheating issues if the current in a 4-pair cable is at or below 0.3 amperes per conductor.

Also new to the 2017 Code is Section 840.160, which covers Power over Ethernet (PoE) communications systems. Section 840.160 does not duplicate the requirements of 725.144, instead it defers to 725.144 when the power supply exceeds 60 watts. Why 60 watts? 60 watts is equivalent to 0.3 amperes per conductor over all 8 conductors in a typical PoE system operating at 50 volts dc, nominal.

Consequently, a 60 watts PoE system used for communications applications in accordance with Article 840 can utilize existing cabling without any examination of the cabling, without determining the bundle sizes and consulting Table 725.144. In other words, just plug it in and start communicating.

On the other hand, the same 60 watt PoE power source used for a Class 2 application, like lighting or surveillance, in accordance with Article 725, utilizing existing cabling, is required to comply with Table 725.144 for bundle sizes up to 192 cables; for bundle sizes over 192 the installation must be “under engineering supervision”. The requirements of 725.144 are having an adverse impact on the installation of Class 2 PoE systems.

Unlike, a 60 watt PoE communications system, you can’t simply plug in a 60 watt PoE class 2 system and use it. You have to figure out if the wiring is ok, even though we know from the UL report that the wiring is ok.

Power over Ethernet systems supplying 0.3 amperes per conductor or less have been shipping for more than 15 years, and industry experience is consistent with the UL report that there is no cause for concern. Requiring consideration of bundle size or employing a professional engineer in deploying systems with these current levels would present an undue burden.

Additionally, the existing text of 725.121(C) requires additional labeling of all power sources by January 2018, even though nearly half a billion ports of these power sources have shipped over the past 15 years without any demonstrated record of loss, and they provide less than 0.3 amperes nominal current per conductor – a level that aligns with the results of the UL Fact Finding Report, and is permitted by the 2017 NEC under Article 840. Updating the manufacture of the large variety, breadth and number of these types of power sources represents an undue burden on industry. At this time, we do not believe that marking PoE power systems that exceed 0.3 amperes by January 2018 would be an undue burden, as the vast majority of currently manufactured PoE power sources are within the 0.3 ampere limit.

This adverse impact on these systems comes from both the rules of 725.144(A), and the marking of power sources in 725.121(C). As recommended by this TIA, these can both be rectified by exempting the affected systems.

### Definition of Nominal Current

The new definition, “Nominal Current” is necessary to account for deviations in conductor current due to circuit imbalances. These deviations are found in commonly deployed systems. The new definition is necessary to avoid adverse impact on these systems. The use of maximum current in 725.144 and the lack of any current level below which there is an exception is inconsistent with the treatment of existing low-power devices in 840.160. The concept of nominal current to account for imbalance and the exception for less than or equal to 0.3 amperes nominal current is applied to 725.144 as well. The Informational Note further clarifies the term “Nominal Current” by providing an example of a common powering arrangement and identifies permissible current imbalances per industry-accepted standards.

### Labeling of Power Sources

The recommended revisions to Section 725.121(C) include identification of the necessary labeling (marking) to help ensure that proper current limits are observed and with the term “nominal current”, alerting the NEC user that current may vary (within acceptable limits) because of circuit imbalances. The recommended exception excepts circuits operating at 0.3 amperes or less from the labeling (marking) requirement in keeping with the conclusions of the UL Fact Finding Report. Changing the labeling to align with the ‘nominal current’ specification of the other changes and excepting 0.3 amperes removes the burden on the industry.

The text as written would require a label per connection point. However, the changes applied to 725.121(C) in the 2017 NEC code cycle were intended to apply to high-density multi-port power sources, such as Power over Ethernet switches. These have many connection points of the same rating in a small front panel space, making a label per connection point impractical. The recommended change inserts text to specifically permit a single label in the case where multiple connection points have the same voltage and current outputs.

### Permission of Circuits Supplying 0.3 Amperes/Conductor or Less

NEC usability is enhanced by identifying applications where Table 725.144 need not be consulted. Systems where 24 AWG or larger conductors are used and the nominal current of the power supply is 0.3 amperes or less on all conductors are excepted from the requirements of Table 725.144. Existing subsections (1) and (2) are combined and revised to indicate that, because of system imbalances, it is the nominal current that is of interest. The new text provides a clear exception to widely deployed systems, supplying power at current levels that the *UL Fact Finding Report on Power over Local Area Network Type Cables (4-Pair Data / Communications Cables)*, dated September 25, 2015, found no cause for concern.

The NEC Correlating Committee, at the direction of the NFPA Standards Council, formed the Power over Ethernet Task Group (PoE Task Group) to address issues regarding the provision of power over Ethernet and communications conductors. Members of the PoE Task Group, including members of NEC Panel 3, NEC Panel 16, and the NEC Correlating Committee, are as follows: E. Gallo – Chair, M. A. Cardona, W. J. McCoy, R. Kusuma, R. Emplit, R. Foster, S. Kaufman, M. Shariff, A. Tassone, G. Straniero, J. Kacperski, R. Ivans, T. Pope, T. C. Coleman, J. Brunssen, J. Goergen, G. A. Zimmerman, M. W. Earley, M. J. Johnston, L. Ayer, P. Vanderlaan, R. Anderson, C. Bullock, S. Stene, M. Ode, and T. Olechna. The PoE Task Group prepared this TIA. In accordance with the Standards Council’s instructions, the task group was broad based and specifically included representation of those with knowledge and experience in telecommunications and Ethernet communications.

## Emergency Nature of the Proposed TIA\*

Select one or all that apply as to why you believe the TIA is of an Emergency Nature:

- The standard contains an error or an omission that was overlooked during the regular revision process.
- The NFPA Standard contains a conflict within the NFPA Standard or within another NFPA Standard.
- The proposed TIA intends to correct a previously unknown existing hazard.
- The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.
- The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public.
- The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

**\*NOTE: a TIA cannot be processed without identification of Emergency Nature above.**

**Detailed basis supporting that the TIA is of an Emergency Nature requiring prompt action:**

By omitting a simple exception to 725.144 for systems at low current levels, the existing text creates a circumstance where it has an adverse impact on the installation of conventional, widely deployed power-over-Ethernet equipment running over existing wiring, which the change seeks to remedy. Industry has shipped over half a billion ports of standards-compliant product over the past 15 years. These products have been supplying nominal current up to 0.3 amperes/conductor without any demonstrated record of loss. Additionally, the UL Fact Finding Report on Power over Local Area Network Type Cables (4-Pair Data / Communications Cables), dated September 25, 2015, finds no concern with these current levels. Under the text of 725.144, as written, these systems and wiring may require consideration of the bundling by the user before installation, whereas today they are user-installable on existing data wiring. This change prevents the unjustified disruption of this ~100 million port per year market, yet retains the intended safety concerns for higher current devices. The new labeling requirement for 725.121(C) asks for labeling of a wide and diverse set of power sources without technical justification. Nearly half a billion ports of these Power over Ethernet power sources have shipped over the past 15 years, and more than 100 million ports per year are expected to ship each year over the next four years before the 2020 code cycle. Manufacturers of these power sources have a wide variety of product types, almost all providing less than 0.3 amperes nominal current per conductor – a level that aligns with the results of the UL Fact Finding Report on Power over Local Area Network Type Cables (4-Pair Data / Communications Cables), dated September 25, 2015, and the proposed code agrees is safe. Updating the large variety, breadth and number of these types of power sources represents an undue burden on industry. This TIA would provide an exemption to the marking, relieving the burden for power sources of 0.3 amperes or less nominal current. Additionally, the changes to 725.121(C) in the 2017 NEC code cycle overlooked the fact that these labels would need to apply to high-density multi-port power sources, such as Power over Ethernet switches, with many connection points of the same rating in a small front panel space. The proposed change inserts text to specifically permit a single label in the case where multiple connection points have the same voltage and current outputs, making labeling practical, and removing the adverse burden.

## Additional Requirements

Please provide the written agreement of at least two members of the involved Technical Committee or Correlating Committee to the processing of the TIA. The agreement to the processing of the TIA is for the sole purpose to allow the TIA to be processed and does not imply support for the proposed text or emergency nature of the TIA.

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5/19/2017