

TIA AND PUBLIC COMMENT INPUTS

ISSUES ADDRESSED:

SAFETY EMERGENCY DUE TO LACK OF AMPACITY IN 840.160 60W EXCEPTION
SAFETY EMERGENCY ON HEALTH CARE SYSTEMS WITH >60C CABLE
SAFETY EMERGENCY DUE TO MISSING TEMPERATURE ADJUSTMENT FOR LP CABLING
CLARIFICATION OF EQUIPMENT LABELING (ALIGNS WITH OTHER CHANGES)
CLARIFICATION OF INCORRECT AMPACITY ON 8P8C CONNECTORS
CLARIFICATION THAT RESULTS RELATE TO 4-PAIR LAN CABLING AND NO OTHER
CLARIFICATION OF LP CABLING INFORMATIONAL NOTE
Text highlighted in **bright green** has not yet gotten consensus
Text highlighted in **yellow** has achieved consensus

CHANGES PROPOSED FOR ARTICLE 725 – PANEL 3

TIAS RELATED TO VARIOUS ISSUES WITH 725

(NOMINAL CURRENT AND MARKING OF OUTLETS TEXT SHOWN IN YELLOW HIGHLIGHT):

725.2 insert new definition:

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 applications based on IEEE Std 802.3-2015 that supplies current over 2 or 4 twisted pairs, but can deviate up to 20% from the nominal on individual conductors due to circuit imbalance. The nominal current for 60W PoE Power Sourcing Equipment is 0.3A per conductor. IEEE Std 802.3 allows the current for one conductor to be 0.36A and another conductor to be 0.24A.

TIA EXPECTED FROM MANUFACTURERS DUE TO IMPRACTICAL DEADLINE

725.121 (C) Changed to include nominal current in labeling and multi-point labeling (Does not include changes above under Manufacturer's TIA to change date is rolled in through another effort):

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 and communications 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.**

Exception – Power sources providing 0.3 A nominal current or less per conductor shall be permitted without marking.

The effective date shall be January 1, **2018**.

No change to 725.130 in this version.

Commented [GZ1]: The effective date will be deleted in the 2020 code – Stan has submitted a PI to do this.

Change 725.144 as shown, changes relevant to nominal current are shown in yellow highlight:

725.144 Transmission of Power and Data. The requirements of 725.144(A) and (B) shall apply to Class 2 and Class 3 circuits that transmit power and data to a powered device. The requirements of Parts I and III of Article 725 and 300.11 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. **The nominal current shall not exceed the ampacity of a single conductor in 4-Pair Class 2 or Class 3 cables. The deviation from nominal current in any active conductor shall not be more than 20%.**

Informational 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 specifies ~~that these connectors are to have a current carrying capacity per contact typically rated at 1.03 amperes maximum at 60°C (140°F).~~ See IEC 60603-7, **Connectors for electronic equipment – Part 7: Detail specification for 8-way, unshielded, free and fixed connectors; for more information on reduced current carrying capacity at higher temperatures.**

Commented [GZ2]: Note about temperature variation in IEC 60603-7 may be revisited to be more general to refer to lower temperatures as well.

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

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

Discussion ended in the middle of (A) below.

(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) **Systems with a nominal current of less than or equal to 0.3 Amperes per conductor on all conductors shall be permitted using conductors of 24 AWG or larger.**
- (2) **The ampacity ratings in Table 725.144 shall apply to the nominal current at an ambient temperature of 30°C (86°F). The deviation from nominal in any active conductor shall not be more than 20%.**

Commented [GZ3]: Discussing whether this is only at 30C when we left off.

(3) For ambient temperature above 30°C (86°F), the correction factors of 310.15(B)(2) shall apply.

Informational Note: One example of the use of Class 2 cables is a network of closed-circuit TV cameras using 24AWG, 60C rated, Type CL2R, Category 5e local area network (LAN) cables.

(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 nominal current level up to the marked ampere limit located immediately following the suffix LP and shall be permitted to transmit data to the equipment. For ambient temperature above 30C (86F), the correction factors of 310.15(B)(2) shall apply. The deviation from nominal current in any active conductor shall not be more than 20%. The Class 2-LP and Class 3-LP cables shall comply with the following, as applicable:

Commented [GZ4]: The statement of how to temperature-adjust LP cable ampacity was inadvertently omitted from the code.

Informational Note 1: The “(xxA)” following the suffix -LP indicates the ampacity of each conductor in a cable.

Informational Note 2: An example of a limited power (LP) cable is a cable marked Type CL2-LP(0.5A), 23 AWG. A Type CL2-LP(0.5), 23 AWG could be used in any location where Type CL2 could be used; however, the LP cable would be suitable for carrying up to 0.5 A per conductor, regardless of the number of cables in a bundle. If used in a 7-cable bundle, the same cable could carry up to 1.2 amperes per conductor.

Commented [GZ5]: Deleted rest of the note to conform with style guide – informational note should not have been (and should not) add interpretation of the code, per style. (Feb 15)

- (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 ampere level 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 ampere level.
- (3) System design shall be permitted by qualified persons under engineering supervision.

Table 725.144 Ampacities of Each Conductor in Amperes in 4-Pair Class 2 or Class 3 Data 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			2-7			8-19			20-37			38-61			62-91			92-192		
	Temperature Rating 60°C 75°C 90°C			Temperature Rating 60°C 75°C 90°C			Temperature Rating 60°C 75°C 90°C			Temperature Rating 60°C 75°C 90°C			Temperature Rating 60°C 75°C 90°C			Temperature Rating 60°C 75°C 90°C			Temperature Rating 60°C 75°C 90°C		
26	1	1	1	1	1	1	0.7	0.8	1	0.5	0.6	0.7	0.4	0.5	0.6	0.4	0.5	0.6	NA	NA	NA
24	2	2	2	1	1.4	1.6	0.8	1	1.1	0.6	0.7	0.9	0.5	0.6	0.7	0.4	0.5	0.6	0.3	0.4	0.5
23	2.5	2.5	2.5	1.2	1.5	1.7	0.8	1.1	1.2	0.6	0.8	0.9	0.5	0.7	0.8	0.5	0.7	0.8	0.4	0.5	0.6
22	3	3	3	1.4	1.8	2.1	1	1.2	1.4	0.7	0.9	1.1	0.6	0.8	0.9	0.6	0.8	0.9	0.5	0.6	0.7

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.

Note 3: Health Care facilities and other essential electrical systems shall only be permitted to use the 75°C (167°F) or higher temperature operation under engineering supervision.

Note 4: The current in the power circuit shall not exceed the per-contact current limitation of the connectors.

Commented [GZ6]: Removed note about cordage exception for 26AWG cabling because it could be considered a requirement in an informational note – may want to consider text in the main section to this effect if needed.

Informational Note 1: For information on practices for 4 pair LAN cabling see ANSI/TIA-568-C.2 and TIA-TSB-184-A. The conductor sizes in data cables in wide-spread use are typically 22-24-26 AWG.

Informational Note 2: Transmission parameters for data cables in common use are often unspecified at temperatures above 60°C (140°F), communications can be unreliable at these temperatures.

CHANGES PROPOSED TO ARTICLE 840 – PANEL 16

Per Text offered by Stan Kauffman:

(this text was reviewed by the Task Group prior to 725 changes – should review it at the end to see if more changes are required)

(Note – text has been updated to delete controversial reference to 725.130(C) which is no longer necessary)

840.160 Powering Circuits. Communications cables, listed in accordance with 800.179, in addition to carrying the communications circuit, shall also be permitted to carry circuits for powering communications equipment listed in accordance with 800.170. The power source shall be listed in accordance with 840.170(G). Where the power supplied over a communications cable to communications equipment is greater than 60 watts, communication cable and the power circuit shall installation of the listed communications cables shall comply with 725.144 where listed communications cables are used in place of substituted for Class 2 and Class 3 cables in accordance with 725.154(A).