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.

Informational Note No. 6: Rated Current for these power sources is the output current applied to a conductor 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.

[VARIATION UNDER FINAL DISCUSSION: 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.]

(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~~ 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.

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

Types CL3P-LP, CL2P-LP, CL3R-LP, CL2R-LP, CL3-LP, or CL2-LP shall be permitted to supply power to equipment from a power source with a rated current per conductor ~~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.

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

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). Installation of the listed communications cables shall comply with 725.144 where communications cables are substituted for Class 2 and Class 3 cables in accordance with 725.154(A).

Exception: Installing communications cables in compliance with 725.144 shall not be required for listed 4-pair communications cables where the rated current of the power source does not exceed 0.3 amperes in any conductor 24 AWG or larger.

Informational Note: A typical communications cable for this application is a 4-pair cable sometimes referred to as Category 5e (or higher) LAN cable or balanced twisted pair cable. These types of cables are often used to provide Ethernet- and Power over Ethernet (PoE)–type services. A large number of such powering cables bundled together can cause overheating of the wiring if not controlled as described in Table 725.144

725.121 (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 output or maximum voltage and ~~nominal~~ 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 output current applied to a conductor at normal operating conditions as declared by the manufacturer.

[VARIATION UNDER FINAL DISCUSSION: 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.**]**

725.2 Definitions [DELETING THE 725.2 DEFINITION OF NOMINAL CURRENT, SINCE IT IS NO LONGER USED, SEEMS ASSUMED – WE HAVEN'T TALKED ABOUT THIS FOR A WHILE]

~~**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.~~