

# Proposal to Resolve the conflict between IEEE 802.3 and IEEE PES Wireline Subcommittee on Proposed FRs 8790, 8859, and 7892

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3/21/18 – revised in IEEE 802.3 SCC18 ad hoc meeting 3/21

(note – highlighted sentences were revised with PES participation, changes shown in underline markup (some within the highlighted parts, were revised after PES members had to leave the meeting due to time constraints)

## Background

Note that the Chair of SCC18 ‘understood’ the PES wireline committee to be opposed to the changes made by panel 3 in 725 related to nominal current, even though PES did not directly say so. (I understand you were focused on the changes made by panel 16 to article 840). If this was not the intention of PES, that will remove controversy on FR 8790 and 8859.

The following FRs are at issue:

FR 8790 – adds definition of “nominal current” to 725.2

FR 8859 – implements the changes to 725.121(C) power source labeling.

### (C) Marking.

The power sources for limited power circuits in 725.121(A)(3) and ~~and~~, 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 per conductor for each connection point. ~~The effective date shall be January 1, 2018 on the power source. Where multiple connection points have the same rating, a single label shall be permitted to be used.~~

Largely implements the changes of TIA log #1299 (TIA 17-11) which specifically allows multiple ports to be treated with the same label, but does not exempt systems with less than or equal to 0.3 Amperes nominal current from the labeling (which the TIA would have done). Note that without this change, all power sources will be labeled with maximum current and voltage, as this is in the 2017 code. Labeling maximum current only would make 725.144 unenforceable. (FYI, on FR8932, which modifies 725.144, SCC18 directed the ER to vote affirmative)

**(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: ~~The ampacity ratings in the ampacities 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 of Table 310.15(B)(2) (a) or equation in 310.15(B)(2) 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 local area network (LAN) cables

5e balanced twisted-pair cabling.

FR7892 – implements changes to 840.160. ER is currently directed to vote affirmative, removing the word “nominal” from the text, but not inserting “rated”. Not sure they can actually do this, as the FR insert the term “rated current” in the exception. IEEE 802.3 opposed this FR, for 3 reasons.

**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. ~~Where the power supplied over a communications cable to communications equipment is greater than 60 watts, communication cables and the power circuit 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 used in place of 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 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.

## Proposal

Here is what I propose for a joint resolution from PES and IEEE 802.3 to SCC18:

Inform SCC18 that both 802.3 and PES support the FRs 8790, 8859, 7892 (and 8932), with the following statement:

FRs 8790, 8859, 7892 and 8932 function as a group to improve the text added to the code in 725.144 and 840.160 in NEC 2017, and amended by 3 TIAs. The relevant IEEE technical committees have reviewed the history of 725.144 and 840.160 as well as use of the term 'rated current' in the code. Rated current is used for input currents and is allowed a 10% exceedance without any offsetting value. 725.144 and 840.160 concentrate on heating of large numbers of circuits providing power over multiple conductors, such as in Power over Ethernet. These systems balance an excess current on one conductor with a corresponding lower current on another of the 8-conductor cable. This resulted in the PoE Task Group recommending definition of a new term, "nominal current". While the term may not be perfect, (the term "average" might be better) we support the principle that a new term is needed, and therefore, the FRs. Nominal may be incorrect, but so is rated. The code needs a new term to apply to multi-pair powering systems, and it needs to be practically labeled for inspection. The changes to Articles 725.121(C), 725.144, and 840.160 provide a start, but still require work in the second revision to make clear that the data and the tables they refer to are only designed for systems using small conductor 4-pair balanced-twisted-pair copper cabling, such as Category 5e, Category 6 or Category 6a as specified in ANSI/TIA-568-C.2.

Additionally, we are concerned that FR 8859 would require marking of all power sources regardless of the current level. Surely there is a current level below which the current is not an issue. The code in 840.160 and 725.144 shows this level to be 0.3 Amperes/conductor, and we would support the re-instatement of the exemption on marking put in by TIA 11-17 (log # 1299).