

Proposal Number: 2018-OA-025

Rule 16-310 and 16-330 (8) - New

Description of Change: Amend ampacity rating of Power over Ethernet (PoE) source equipment

Submitted by: Peter Olders, Ontario Electrical Industry Training Trust

Background:

New Rules, 16-300 to 16-350 are added in CE Code 2018 and apply to Class 2 power and data communication circuits, such as Power over Ethernet (PoE). The industry has issued the proposal for changes, new Rule 16-310 and amendments in 16-330(8), see the attachment.

February 9th, 2018

Electrical Safety Authority
155 Matheson Blvd West
Mississauga, Ontario, L5R 3L5

Attention:
Ted Olechna, Director Codes and Standards Support
Tatjana Dinic, Code Engineer

Subject: OESC 2018 Code Proposal

Requests: Amend current 2018 CEC Rules 16-310 and 16-333(8) in the 2018 OESC as shown:

(A) Add additional term

16-310 Special terminology (see Appendix B)

[Nominal Current - The designated current per conductor as specified by equipment design limits.](#)

(B) Add new Appendix B Note

[Rule 16-310](#)

[Nominal Current](#)

[One example of nominal current is 4-pair Power over Ethernet \(PoE\) applications based on IEEE 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 the current in another conductor can be 0.24 amperes.](#)

(C) Revise Subrule 16-330 8)

16-330 Cables and conductor ampacity (see Appendix B)

Notwithstanding Subrules 2) and 3), where ~~communications equipment rated at 60 W or less is powered by~~ [power sourcing equipment rated at a nominal current not exceeding 0.3 amperes in any load conductor and where this power sourcing equipment is connected to](#) a communications cable having a minimum conductor size of 24 AWG, such communications cable shall not be required to comply with bundling requirements.

Rationale and Supporting Information:

This Subrule exception was originally included in the 2018 CEC to allow for the many millions of low-current PoE systems that have been deployed over the last fifteen years. The wattage limitation was based on the premise that PoE systems would comply with the IEEE 802.3af/at standards and operate at approximately 50 Vdc. The 60 Watts limit was based on a UL LLC Fact Finding Report that also became the basis for NFPA 70 amendments. Also, the SPI, Plastics Industry Trade Association report appears to be the basis for other 2018 CEC cable performance parameters such as the 1.4 multiplier in Rule 16-330 3) c) and current limits in Table 60.

<http://www.plasticsindustry.org/sites/plastics.dev/files/SPI%20Fact%20Finding%20Report%20%28Issue%202015-09-25%29%2BErrata%201%2%A9UL%26SPI.pdf>

Quoted from the report:

The data also shows that overheating does not generally occur at 0.3 amperes per conductor (60 watts) which represents some of the newer higher power systems. This is clearly shown in the accompanying chart that shows the temperature rise for a wide variety of scenarios tested at 0.3 amperes per conductor. Overheating does not occur even if the data is corrected for a 30°C ambient or a 45°C ambient.

In Subrule 8), the term “communications equipment rated at 60 W or less is powered by” suggest that it refers to the **powered device** as opposed to the **power source equipment** (see 16-310, Special terminology below). The proposed current limit should specify the maximum current a power supply can deliver, not the maximum current that a load can draw.

16-310 Special terminology

Powered device — equipment supplied with power from power sourcing equipment and that may be capable of communicating data.

Power sourcing equipment — equipment that supplies power to powered devices and that may be capable of communicating data.

As the subrule presently states it is possible to apply dangerously high current on only a single cable pair. For example, a 60 watt load operating at 12 Vdc could potential draw 5 amps over a 24 AWG conductor – more than double what is specified in Table 57.

Moreover, using watts as a parameter for conductor heating is incorrect - current is the correct parameter

From my perspective, it appears that this NEC error eventually propagated its way into the 2018 CEC. However, the error has been corrected in the 2017 NEC.

https://www.nfpa.org/assets/files/AboutTheCodes/70/TIA_70_17_12.pdf

As indicated in the amendment, this article is now in force as of December 26, 2017 stating "... where the nominal current does not exceed 0.3 amperes...".

Regards,

Peter Olders
Ontario Electrical Industry Training Trust