

Proper MC-PCS Wire Connections

**New Cable Type Requires New Solutions
to Provide Code Compliance and Safety**



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Growing Potential

The commercial lighting market is growing for:

- Fluorescent and/or LED Luminaire Dimming
- Integrated Lighting Controls
- SMART Buildings

MC-PCS cable types growing in popularity

- Combine both power and control circuits in one flexible metal-sheathed cable
- Used primarily in commercial construction
- Reduce installation time and materials
- Work with standard MC fittings



Image: Adobe Stock



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MC-PCS Cable

Features:

- 2 power-and-lighting conductors and 1 equipment grounding conductor
- 2 Class 2 control/signal conductors
- Allowed by Code because the Class 2 conductors are sheathed in additional insulation
- May be surface mounted, fished or embedded
- Can be used in Class 1, Class 2 or Class 3 applications
- UL Listed
- Covered under NEC® Section 725.136 (upcoming revised 2020 *NEC* Section 330.104)

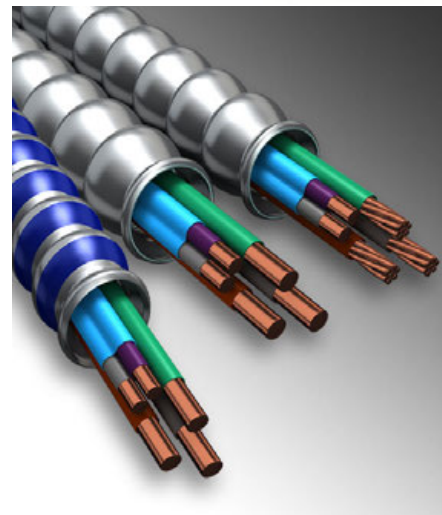


Image: AFC Cable Systems



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Potential Danger

What happens when the insulation surrounding the Class 2 conductors is removed, to expose the wires for splicing?

NEC 725.136 does not allow power-and-lighting and Class 2 conductors to exist in the same space without certain precautions.

(detailed in Sections B through I)

Improperly terminated control wires may become energized by contact with power-and-lighting conductors, creating hazards for users and equipment



Image: NEMA



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Code Compliance

NEC 725.136 requires proper separation between power and control/signal wires

- Inside the flexible armored cable, the specified **30mil PVC** outer jacket over the signal pair creates the appropriate barrier
- Safe termination in a box or enclosure is not as clear cut
 - **Barriers**
 - **Distance**

725.136 Separation from Electric Light, Power, Class 1, Non-Power-Limited Fire Alarm Circuit Conductors, and Medium-Power Network-Powered Broadband Communications Cables.

(A) General. Cables and conductors of Class 2 and Class 3 circuits shall not be placed in any cable, cable tray, compartment, enclosure, manhole, outlet box, device box, raceway, or similar fitting with conductors of electric light, power, Class 1, non-power-limited fire alarm circuits, and medium-power network-powered broadband communications circuits unless permitted by 725.136(B) through (I).

The lower voltage ratings of listed Class 2 and Class 3 cables do not allow them to be installed with electric light, power, Class 1, non-power-limited fire alarm circuits, and medium-power network-powered

Image: NEMA

NEMA simply recommends keeping the outer jacket on control wires to the point of termination, and removing the minimum amount of jacket to make a splice (Bulletin No. 112)

In practice, electrical inspectors are addressing the issues in several ways...



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Safest Solution

A)

Require the Class 2 conductors to be spliced in a separate enclosure

- Safe
- Power-and-lighting conductors are not present
- Correct installation best fits the **Barrier** option

Alternative options include porcelain tubes

Problem for the market: Cost prohibitive



A: Class 2 wires in separate enclosure

Image: NEMA



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Safer Solution

B)

Physically separate both systems within the same space

- Safe
- Create a **Barrier** in the space between the two systems
- To fit the **Distance** option, route wires to maintain 0.25"-2" space (*depending on application*)

Problem for the market:

Often difficult to find room to separate conductors in crowded boxes or fixtures by either barrier or space



B: Physically separated in same space

Image: NEMA



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Safe Solution?

c)

Some installations may be approved because the separation is assumed to be $\frac{1}{4}$ "

If not, Inspectors refuse approval of installations such as this

- Simply not code-compliant
- Simply *not safe*

Problem for the market:

Difficult, in practice, to find room to separate conductors in crowded boxes or fixtures

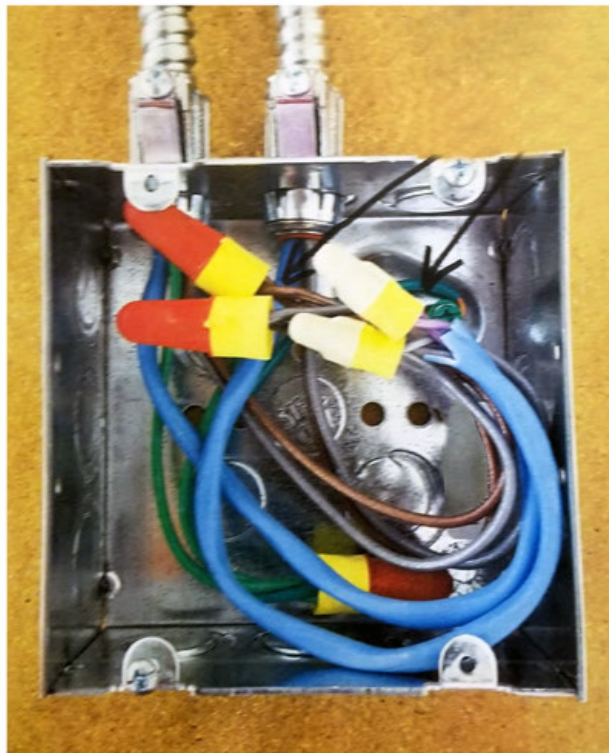


Image: NEMA

C: Violation, Not Code Compliant



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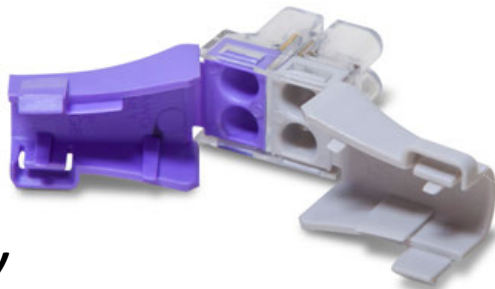


Superior Solutions

The industry needs a safe, robust, Code-compliant solution

A better solution would be a connector listed for splicing and protecting MC-PCS Class 2 conductors. For example, RACO's new push-in **Shield-IT™** connector:

- Simple
- Easy to use
- Compact
- FAST to install
- ***And easy to verify proper installation***



Images: Hubbell



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Why it's safer

RACO Shield-IT™ type connectors feature:

- **SAFE** – Replaces the insulation removed for splicing
- Permits CODE COMPLIANCE (*UL and CSA Listed*)
- Eliminates the risk of Class 2 conductors becoming energized by contact with power-and-lighting conductors
- Design maintains proper separation
- See-thru housing for easy visual inspection
- Handle 2-4 pairs per connector
- Reduces wiring time by 75%, just strip, push in and snap shut
- **Stays inside the same box as power-and-lighting conductors**



Image: Hubbell



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The Role of Inspectors

Electrical inspectors are the key to the industry adopting superior solutions

- **Promoting SAFE** installations
- **Ensuring** code-compliant installations, whether physically separated or using Listed connectors



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QUESTIONS?

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