

Surviving the Survivable Cable Crunch

by Dean K. Wilson, P.E.

***Question:* I am a fire inspector in a mid-western city. We have recently received preliminary plans for four high rise apartment buildings. Naturally, in our jurisdiction, we expect the fire alarm systems for these buildings will meet all of the requirements of NFPA 72-2010, *National Fire Alarm and Signaling Code*[®]—or, when it is formally adopted in our state, NFPA 72-2013. We have heard from several sources that we will likely have a problem with the survivability of notification appliance circuits because contractors can no longer obtain the survivability rated cable. Can you enlighten me on this issue?**

Yes. This matter represents a significant challenge to designers, installers, and code officials alike. You see, on September 12, 2012, Underwriters Laboratories Inc. decided to remove the listing for all 2-hour rated cables and cable assemblies. This action has sent a shockwave of concern throughout the fire alarm industry.

Routinely, fire alarm system installers have used these cables to meet the requirements for fire alarm systems installed to provide notification to occupants within high-rise buildings. Other applications include any occupancy where the fire alarm system must maintain operational integrity during the course of a fire event within that occupancy. And, installers of electric motor-driven fire pumps often use the larger amperage capacity versions of these cables to supply power to the fire pump's electric motor when the feeder circuit must pass through the protected building.

In the version of NFPA 72 that your jurisdiction continues to use, NFPA 72-2010, Chapter 12, specifically states the following requirements:

12.4 Pathway Survivability. All pathways shall comply with NFPA 70, National Electrical Code.

12.4.1 Pathway Survivability Level 0. Level 0 pathways shall not be required to have any provisions for pathway survivability.

12.4.2 Pathway Survivability Level 1.

Pathway survivability Level I shall consist of pathways in buildings that are fully protected by an automatic sprinkler system in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, with any interconnecting conductors, cables, or other physical pathways installed in metal raceways.

12.4.3 Pathway Survivability Level 2. Pathway survivability Level 2 shall consist of one or more of the following:

- (1) 2-hour fire-rated circuit integrity (CI) cable
- (2) 2-hour fire-rated cable system [electrical circuit protective system(s)]
- (3) 2-hour fire-rated enclosure or protected area
- (4) 2-hour performance alternatives approved by the authority having jurisdiction

12.4.4 Pathway Survivability Level 3. Pathway survivability Level 3 shall consist of pathways in buildings that are fully protected by an automatic sprinkler system in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, and one or more of the following:

- (1) 2-hour fire rated circuit in tegrity (CI) cable
- (2) 2-hour fire rated cable system (electrical circuit protective system(s)»
- (3) 2-hour fire rated enclosure or protected area
- (4) 2-hour performance alternatives approved by the authority having jurisdiction

12.5 Nomenclature. To identify the properties of the system(s) interconnections and survivability requirements, the following identification nomenclature shall be used:

- (1) System(s) interconnections
- (2) Survivability levels (not required if Level 0)

From all of the information I have seen thus far, it appears the initial cause for concern stems from a test conducted for a particular cable manufacturer who asked that UL test its cable with the cable installed within rigid metal conduit (RMC).

The cable in the test failed. UL has made an initial determination that points to a chemical reaction whereby the zinc coating of the conduit combined with the copper of the cable under the heated pressure conditions inside the RMC during the fire test. Manufacturers of Rigid Metal Conduit commonly rely on this zinc coating as part of the corrosion resistant protection for the conduit.

Reportedly, following this individual test failure and subsequent investigation into the cause, UL then ran additional tests on existing listed circuit integrity (CI) cable and discovered inconsistencies in performance, particularly with regard to the consistent performance of the cables during repeated fire tests.

Based on these issues, all products and systems originally certified under UL 2196, Tests for Fire Resistive Cables, and ULC-S139, Standard Method of Fire Test for Evaluation of Integrity of Electrical Cables, will no longer receive the listing that had previously existed under the program formerly based on these standards.

As a result, cable manufacturers are no longer authorized to place the UL mark or ULC mark on the following products:

- UL Classified Fire Resistive Cable (FHJR)
- ULC Listed Fire Resistant Cable (FHJRC)
- UL Listed cable with “-CI” suffix (Circuit Integrity)

Furthermore, UL has removed all Electrical Circuit Protective Systems (FHIT) constructed with Fire Resistive Cable from its certification directory.

The National Electrical Manufacturers Association (NEMA) has responded to UL's action by issuing the following statement:

"Electrical Circuit Protective Systems are very specialized systems used in applications such as fire pumps, emergency systems, fire alarm and tunnels. It is the cable manufacturer that tests their cables with specific system components in order to achieve a fire-rating for that system. Typically, fire-resistive cable manufacturers have tested their cables in EMT and if their cables passed the test in EMT, they were allowed to be used in IMC or rigid steel conduit as well.

"It is important to note that this change was not due to any quality issue with conduit. One of the manufacturers of the fire-resistive cables was testing their cables inside of hot-dip galvanized rigid conduit and discovered a compatibility issue between the copper conductors and the zinc on the interior of the rigid steel conduit. Although the cable manufacturer reported an issue only with a conduit with a hot-dip galvanized interior, UL is taking a conservative stance and is requiring that components used in these systems have zinc-free interior coatings, while they conduct research on the issue.

"EMT and IMC manufactured by members of NEMA Section 5RN (Steel Conduit and EMT) are listed to UL 797 and UL 1242 respectively and do not have zinc interior coatings. The interior coatings are specialized organic coatings that provide a high degree of corrosion protection and easy wire-pulling."

In late September, the NFPA Technical Correlating Committee on Signaling Systems for the Protection of Life and Property (TCC) met with representatives of Underwriters Laboratories Inc. and learned that UL plans to rewrite the requirements for UL 2196 and ULC-S139 to make the required fire tests more consistently repeatable. In order to accomplish this rewrite, UL has reformed the Standards Technical Panel (STP) for these standards and has developed a work plan to begin the rewriting of the requirements.

Because no data exists to prove that prior listed cables do not meet the requirements of these standards, UL has stated that the actions they have taken will *not* affect the listing of all existing cables already installed. Furthermore, any cables listed under these standards that have already shipped to distributors and job sites will remain listed and will maintain the appropriate designation under the requirements of UL 2196.

The NFPA Technical Correlating Committee on Signaling Systems for the Protection of Life and Property (TCC) has decided to wait for UL to conclude its planned actions before taking any specific actions of their own regarding revisions to either Chapters 12 or 24 of NFPA 72-2013, *National Fire Alarm and Signaling Code*[®].

However, IMSA members should particularly note that NFPA 72-2013, Chapter 27—“Public Emergency Alarm Reporting Systems”—now requires installers to use Type CI cable for public communications cables and furthermore requires that installers place these Type CI cables in RMC. Because UL’s investigation has proven that this installation method will compromise the function of the Type CI cable, the NFPA Technical Committee on Public Fire Reporting Systems and the NFPA TCC will promptly process a Tentative Interim Amendment (TIA) to revise or remove the requirement from Chapter 27 of NFPA 72-2013.

Whether you work with fire alarm systems as a designer, installer, or code official, you will need to stay on top of this matter as it develops in the months ahead. I will attempt to bring any significant changes to your attention through this bi-monthly column.

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