

Wiring is The Glue That Holds Fire/ Life-Safety Systems Together

by Al Colombo, Technical Editor

Fire detection and notification is a serious profession and those who install and service these sophisticated electronic systems must always be vigilant and proactive in the area of codes and standards, as well as changes that take place in the systems they install.

Probably one of the most basic starting points where it comes to doing a professional installation is wiring. Although cable basics are something all fire alarm technicians should know, the various code considerations often go unobserved. The foremost reason for this is the fact that most installers do not own a single codebook.

This month, we will discuss several do's and don'ts associated with fire alarm wiring. It is my hope this article will inspire fire alarm technicians and alarm installing dealers to purchase NFPA 72, National Fire Alarm Code (NFAC); NFPA 70, National Electrical Code (NEC); and NFPA 101, Life Safety Code and use these essential publications to install code-compliant life-safety systems.

Follow Code, Printed Instructions

The first rule of thumb when installing life-safety systems is to follow the manufacturer's installation instructions. This is especially important when choosing the right wire for the job. Mistakes made during prewiring might not show up right away, but they will later.

For example, Nick Markowitz, owner of Markowitz Electric Protection based out of Verona, Pa., was recently on a remodeling job installing telephone wire for an interconnect company (private phone company) when he stumbled onto a fire alarm problem that was apparently created when the system was first installed.

“Here we are, years after the original installation, and a remodeling contractor cut some fire alarm wires while removing some sheetrock. It triggered the fire alarm system when he did it,” says Markowitz. “I looked at the wiring inside the wall and saw it was only 22-gauge telephone station wire. Also, it wasn't in conduit like it's supposed to be.”

Not only that, but when he looked at the bell circuit, he noted that the installers used the same 22 AWG wire to power up the fire bells.

“When the fire alarm technicians arrived to fix the torn wires, I mentioned all of this to them. But they didn't seem to be at all interested in what I told them.”

Markowitz proceeded to contact the city of Pittsburgh's code enforcement division. Inspectors visited the jobsite to take a look for themselves. According to Markowitz, the alarm firm was then made to correct its errors.

Markowitz says Pittsburgh requires fire alarm wiring to be a minimum of 18 AWG and it must be installed in conduit. In addition, many alarm panel manufacturers call for a minimum of 18 AWG.

NEC and NFAC also address the issue of wire type. According to Section 4.3.1 of NFPA 72, 2002 Edition,

“ ... fire alarm system components shall be installed in accordance with the manufacturer’s installation instructions.” So if the panel manufacturer says to use 18-AWG wire, the installer must do so in order to be code compliant on the job. Also, Article 10.3(B) in NFPA 70, National Electric Code (NEC), says, “Listed or labeled equipment shall be installed and used in accordance with any instructions included in the listing or labeling.”

Hang Your Wire to NEC Specs

Not all municipalities require fire alarm wire to be installed in metallic conduit. Where this is so, another common problem is how cable is fastened to the structure.

Article 760.57 of NEC specifically covers this issue. It says, “Power-limited fire alarm circuit conductors shall not be strapped, taped, or attached by any means to the exterior of any conduit or other raceway as a means of support.”

In a facility where there is a suspended ceiling, for example, it is not uncommon to find fire and burglar alarm cable lying loose on top of the tile and grid work (see photo). Another ploy used by some fire technicians is to use the grid wire that supports a suspended ceiling to also support their low-voltage wiring, which is not compliant with NEC.

Article 300.11(A), NFPA 70, provides helpful direction in this regard. It says, “Support wires and associated fittings that provide secure support and that are installed in addition to the ceiling grid support wires shall be permitted as the sole support. Where independent support wires are used, they shall be secured at both ends. Cables and raceways shall not be supported by ceiling grids.”

There are a variety of brackets that can be used to support fire alarm wire. In many cases, all that is needed is a series of support wires secured to the upper deck and to the grid using a twist-on bracket that fastens to these additional support wires.

Boxes, Bushings & Conduit Fittings

Another important issue is the use of metal boxes when installing fire alarm devices. There are a number of common-sense reasons why you should use back boxes with fire alarm devices (see photo), but the most compelling of all is contained in NEC.

“Where the wiring method is conduit, tubing, Type AC cable, Type MC cable, Type MI cable, nonmetallic-sheath cable, or other cables, a box or conduit body complying with Article 314 shall be installed at each conductor splice point, outlet point, switch point, junction point, termination point, or pull point, unless otherwise permitted in 300.15(A) through (M)” (Article 300.15, NFPA 70, 2002 Edition).

Another issue fire technicians must consider pertains to bare wire and metal boxes. Here, bushings are allowed to be used in the knockouts of alarm control panels and metal electrical boxes to reduce the likelihood of abrasion. Bushings usually consist of a closed galvanized nipple, two nut rings and an insulated cover that essentially protects a cable's insulation. N

3 Primary Code Books You Need

There are three basic codebooks that all fire alarm technicians need to have in order to do a good job at installing and maintaining fire alarm equipment. Without them, a technician is flying nearly blind when he/she installs a fire alarm system. They are NFPA 70, National Electric Code (NEC); NFPA 72, National Fire Alarm Code (NFAC); and NFPA 101, Life Safety Code.

Contrary to what many fire alarm installers and security dealers believe, NFPA 72 is not the sole code to which they must account when installing fire alarm systems. In many sections of NFAC, the writers refer the installer to NEC for direction.

A good example is found in Section 4.4.4.4 of NFPA 72. "The installation of all wiring, cable, and equipment shall be in accordance with NFPA 70, National Electrical Code, and specifically with Article 760, 770, and 800, where applicable. Optical fiber cables shall be protected against mechanical injury in accordance with Article 760."

Article 760 covers the installation of fire alarm systems, 770 covers fiber-optic cable, and 800 covers communications circuits. NFPA 101, Life Safety Code, is another very important code book that all fire technicians should have. It explains the elements required in just about every conceivable situation - both new and existing. Without it, you could easily under or overprotect, where either one could unnecessarily cost your firm money and public credibility.

To find out more about these three very important code sets or to place an order, call the National Fire Protection Association (NFPA) at (800) 344-3555 or on the Web at <http://www.nfpacatalog.org/>.