



# Make Sure You're (Inter)Connected

By Matt Klaus and Paul Dunphy

Advancements in mobile communication technology have made “staying connected” an integral part of day-to-day business operations for many of us. Making sure your fire protection and life safety systems are properly connected is equally important. Fire protection and life safety systems often rely on one another to enhance the level of safety provided for building occupants. This enhancement is of no value if the systems do not communicate as intended by the system designers.

In some buildings, these integrated systems are fairly simple. They may include an automatic sprinkler communicating with a fire alarm system through a waterflow alarm device (flow switch). Other buildings may have more complex interconnections for systems, including smoke management systems, special suppression systems, fire doors and dampers, and elevator systems. No matter how simple or complicated the systems are that are integrated, confirmation of the functionality of these interconnections is critical.

## MANDATES AND LEGALLY ENFORCEABLE STANDARDS

One of the problems that many members of the fire protection and construction industries have become all too familiar with is the lack of a mandate to confirm this functionality prior to building occupancy. Some model codes may require an integrated test for specific systems, such as atrium smoke control systems, however there is no across-the-board mandate that other integrated

systems must also go through an integrated system test. Many owners and contractors look to the individual system design and installation standards for some sort of requirement that will make sure that integrated tests are conducted.

Unfortunately, the scopes of these documents typically prohibit them from requiring or addressing testing on a dif-

ferent system. For example, NFPA 13, the Standard for the Installation of Automatic Sprinkler Systems, cannot require a test of a fire alarm or system component. Similarly, NFPA 72, the National Fire Alarm and Signaling Code, cannot mandate the testing of other systems or components, such as fire dampers or fire doors, even if these components are tied into the fire alarm system.

This lack of a mandate often leaves the building owner and their facilities maintenance personnel wondering if everything is properly interconnected. Wondering if they got what they paid for when the building was constructed. Unfortunately, the lack of connection between these systems—or simply the improper sequencing of connections—is often found once the construction warranty has expired, taxing the maintenance budget for an item that should

have been caught prior to the issuance of the certificate of occupancy.

As a means for detecting these deficient connections at the appropriate time, NFPA's Technical Committee on Commissioning and Integrated Testing, with approval from NFPA's Standards Council, initiated a new project, NFPA 4, tentatively titled “The Standard for

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Integrated Fire Protection and Life Safety System Testing” (see sidebar on next page.) The goal of this standard is to provide direction on the structure and execution of integrated fire protection and life safety system tests within a legally enforceable document.

## INITIAL VS. PERIODIC INTEGRATED SYSTEM TESTS

Although this document is only in its infant stages of development, an initial draft was approved by the Standards Council in March 2012. The draft, which is open to the public until October 17, 2012, 5PM (EST), includes concepts that will most likely be included in the inaugural edition of the document. One of the major concepts is the separation between the initial integrated system test that occurs prior to building occupancy, and the periodic integrated

test that will occur once the building is occupied. The periodic integrated system test will either occur at a frequency identified in the integrated test plan, or when an integrated system test is triggered by building modifications.

The initial integrated test can be coordinated with the initial acceptance testing for individual systems to limit the financial impact for building owners. The integrated test conducted prior to occupancy is not intended to “reevaluate” the performance of individual systems, but rather to confirm the performance of the interconnections between the systems.

A classic example would be an atrium smoke control system. The intent of the integrated test is to ensure that when a flow switch trips, the appropriate dampers close, fans turn on, and a signal is received by the fire alarm control panel notify occupants to evacuate. It is not the intent of this test to confirm that the appropriate volumetric flow rates for supply and exhaust fans are reached or that the system ramps up in the time identified by the system designers.

Those items are considered individual system performance criteria and should be covered during the acceptance test for that individual system. This is not to say that the integrated testing agent cannot coordinate tests with contractors so that the performance of the individual systems and their interconnections are all verified in a single test, simply that it is not the intent to reconfirm individual system’s performance.

Periodic integrated testing can take on multiple forms depending on the building, occupancy and the risk tolerance of the owner. For simple buildings that have few interconnected systems, periodic integrated testing may be seen to have little value. In these instances the owner and integrated testing agent may not include a specified frequency for retesting, but rather may simply require testing where a system is being upgraded, removed, replaced or significantly altered.

In other instances where, based on the occupancy or functionality of the build-

## NFPA 4: The Next Logical Step

Harvard University has applied NFPA 4 (Standard for Integrated Fire Protection and Life Safety System Testing) in various ways during the recent period of new construction and large renovation projects. Without a published code document, one of our challenges has been helping folks understand the process, and when to implement the integrated testing. Developing a plan and assembling a team takes time so the earlier you start the better. The cost can be a factor as well. But the results can be eye-opening and very important in helping owners and facilities staff to understand how critical building systems operate under emergency conditions.

I have been a member of the NFPA 3 technical committee for a few years. It has been a learning process for me to see a consensus document developed in such a way as to satisfy a majority of members. We debated whether to roll the document out as a recommended practice or a standard. As you know, NFPA 3 is now available as a recommended practice. It is very useful to me at Harvard, as it greatly expands upon my guideline. But looking ahead, NFPA 4 will fit the bill as we continue to build and renovate complex buildings. Our academic facilities, labs, libraries, museums, dormitories, graduate apartments and underground parking garages are not our “father’s buildings.” It is absolutely critical to test the interfaced and integrated fire and life safety systems. We typically contract commissioning agents on projects. They perform a valuable service but usually do not get into the integrated testing.

NFPA 4 is the next logical step in the process in ensuring the owner that they are getting what they buy. The Harvard community has embraced the concepts of NFPA 4 and it has been rewarding to see critical test findings resolved. Starting out a few years ago, we typically did our integrated testing after a certificate of occupancy was issued. Today, the University is including integrated testing in the specifications for a project. Planning is underway early on and contractors are buying in at the start. The goal is to have our buildings tested and working as designed before a C of O is issued. An important goal but NFPA 4 is a valuable tool for all involved.

— Paul Dunphy, Harvard University

ing, the owner has a lower risk tolerance, such as power generation facilities or hospitals, a specified frequency of three or five years might be warranted. Whatever the selected frequency or list of periodic integrated testing triggers, budgeting for these tasks can become quite difficult. Often times the decision to establish such a frequency is made under one set of financial conditions, however the actions must be carried out under another. This can lead to revisions to the initial integrated test plan. Conducting periodic integrated test based on certain triggers can be a little bit easier to plan for and budget depending on the level of complexity of the interconnections.

### YOUR INPUT IS WELCOME

The continued development of these

concepts and this standard will be based upon the work of the technical committee, as well as code change proposals from the general public. To review the draft and propose a change to this standard, please go to [www.nfpa.org/4](http://www.nfpa.org/4) and click on the Next Edition tab. ☛

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