

Quarterly Newsletter

Merton Bunker & Associates

Ensuring Fire Protection System Reliability

- Fire protection systems are not used every day. Inspection, testing and maintenance is essential to proper operation.
- The owner is responsible, under the law, to ensure ITM is completed.



Fire protection systems make buildings safer. But unlike many other building systems, fire protection systems are not used every day. Telephones, HVAC, lighting, and plumbing systems are used by building occupants daily; therefore, they are monitored for integrity through use. When domestic water or HVAC isn't working properly, occupants usually register a complaint with building management staff. But when a fire alarm system fails, nobody may be the wiser.

Maintenance and care of any system will help that system last longer and operate more effectively when needed. Insurance loss data indicates the average lifespan of a fire alarm system is about 15 - 20 years. Fire pumps typically last about 25 - 30 years, and sprinklers should have a 50 year lifespan. Systems that are not well maintained will probably experience early failure.

Fire alarm systems tend to have a shorter lifespan because most systems are

built using electronic components. These electronic components have predictable failure rates between one and three percent per year. Most systems are now microprocessor-based and technology is rapidly changing. Replacement parts and system components may not be available after the equipment is out of production. It is essential that the designer specify system components that are planned to be in production for as long as possible. Compared to fire alarm systems, fire pumps and sprinklers are low tech, and parts are generally available throughout the projected lifespan of the system.

Implementation of fire protection system inspection, testing, and maintenance (ITM) program will greatly help ensure critical fire protection systems operate when needed. Most jurisdictions adopt one of the model codes, which in turn, reference a number of other



standards that require system maintenance. In the case of fire alarm systems, NFPA 72, *National Fire Alarm and Signaling Code* provides ITM requirements. For water based suppression systems, NFPA 25, *Standard for Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems* is referenced in the model codes. Special hazard systems are covered by other standards, such as NFPA 12 or NFPA 2001.

This story is continued on Page 2.

Ensuring Fire Protection System Reliability (continued)

Few systems are truly 100% reliable. In order to be perfectly reliable, a system may not have any component failures and must operate "on demand" all the time. Counter to popular belief, system reliability is not improved by periodic inspections and tests. However, a good ITM program will uncover component failures within prescribed time limits. NFPA 25 and NFPA 72 both contain specific time limits for periodic tests of fire protection systems. Where adopted, these standards are law and must be followed. Be sure to check with your authority having jurisdiction (AHJ) to determine what codes and standards are adopted where you work.

As a fire protection professional or building operator, you may be responsible for implementation of an ITM program. Both NFPA 25 and NFPA 72 place responsibility for ITM programs squarely on the building or system owner. Both documents do; however, permit the owner or occupant to delegate responsibility for ITM programs to another party, such as a qualified individual or qualified maintenance firm. Generally speaking, the individual must be "qualified and experienced" to conduct the work. Being "qualified and experienced" will generally require some form of mentoring or apprentice program to teach new staff.

NFPA 25 does not use the term "qualified and experienced" but NFPA 72 does. NFPA 72 provides examples of qualifications in Section 10.4.3.1, which reads as follows:

"Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of systems addressed within the scope of this Code. Qualified personnel shall include,

but not be limited to, one or more of the following:

*(1) Personnel who are factory trained and certified for the specific type and brand of system being serviced.
(2) Personnel who are certified by a nationally recognized certification organization acceptable to the authority having jurisdiction.
(3) Personnel who are registered, licensed, or certified by a state or local authority to perform service on systems addressed within the scope of this Code.
(4) Personnel who are employed and qualified by an organization listed by a nationally recognized testing laboratory for the servicing of systems within the scope of this Code."*

These are examples, not limitations. Nationally recognized certification programs include those offered by the National Institute for certification in Engineering Technologies (NICET) and the International Municipal Signal association (IMSA). Some jurisdictions may require a license or other certification. In any event, ITM personnel must be properly trained and experienced. Be sure to check with your AHJ to determine local requirements.

Those who require training may wish to partake in seminars and workshops offered by a large number of providers. Among these providers are the National Fire Protection Association, International Municipal Signal Association, or the Automatic Fire Alarm Association. Merton Bunker & Associates also offers a variety of training programs tailored to your needs.

Before beginning any testing program, most NFPA codes and

standards require notification of the AHJ and building occupants.

Both NFPA 25 and NFPA 72 require notification in Sections 4.1.3 and

14.2.3, respectively. The use of e-mail, text messages, signs, live voice announcements, and similar methods are highly encouraged.

Also be sure to call any supervising station and the fire department non-emergency dispatch numbers to place systems in test. The author has personally experienced an unplanned fire department response during tests because a contractor failed to follow this simple step.

Be sure to coordinate all trades necessary for testing, and limit areas that will be tested. Be sure to plan ahead to prevent other issues that affect building operations. Off-hours testing is always recommended to prevent disruption.

For example, testing elevator recall smoke detectors at lunch time will certainly draw the ire of many occupants. Conducting a fire pump flow test in freezing weather may create icy parking lots or sidewalks.

Fire pumps, fire alarm systems, elevators, security/access systems, and HVAC systems are all interconnected and may require reset after testing. Please be sure you plan ahead for all contingencies.

Be sure to have the correct number of personnel on the job site to complete the tasks. For example, remote annunciators will require a third person to validate that all functions are properly annunciated during the test.

Having the proper tools and documentation for the tests is

Ensuring Fire Protection System Reliability (continued)

essential. These include the following:
 Operations and Maintenance (OM)
 Manual
 Record (as-built) drawings
 Sequence of operations or matrix of operations
 Ladders
 Aerosol smoke or equivalent
 Hand tools (wrenches, screwdrivers, etc)
 Volt Ohm Meter (VOM)
 Battery tester
 Jumpers
 Heat source
 Sound Pressure Level (SPL) meter
 Hoses and flow meter
 Stopwatch
 Two-Way Radios

All new fire protection systems require a 100% inspection before testing and a 100% test at the time of acceptance. It is highly recommended that a 100% inspection and pre-test be conducted before calling the AHJ for a final inspection/test. Pre-tests will ferret out issues that might prevent a complete test and acceptance of the system. Third party agents or consultants can greatly improve quality assurance programs by providing that "extra pair of eyes" that always seem to catch what other miss.

Modification of existing systems will require re-test of all known changes. For sprinklers, this generally includes a hydrostatic test of all new or disturbed piping. Fire alarm system changes will

include a test of all known changes to the system. If the system is software controlled, an additional 10% of initiating devices must be tested (randomly) for all site-specific software changes.

Even if an existing system is not modified, it still requires periodic testing. As mentioned above, this is to detect failed components in a prescribed timeframe. Both NFPA 25 and NFPA 72 contain periodic test frequencies for all system components. These documents also provide test methods for each component or system type. Maintenance of fire protection systems is generally quite simple. For example, diesel fire pump drivers require lubrication/filter changes. Sometimes, packing may require replacement. Fire alarm system maintenance may require replacement of dirty smoke detectors or replacing printer paper/ribbons.

After ITM is complete, NFPA 25 and NFPA 72 require ITM personnel to complete records of inspection and test. Blank copies of these records are found in the applicable standards and are also available from NFPA in an electronic format from their web site (www.nfpa.org).

The owner is responsible for retention of ITM records for fire protection systems. These records must be retained for a minimum period of one year after the next test. Records and system

documentation is a critical part of any ITM program. All documentation must be retained in a safe place where it can be easily retrieved. Many owners keep paper copies as well as electronic (scanned) versions on their servers.

When systems fail and cannot be repaired, they must be replaced. At a minimum, the AHJ must be notified when a system is out of service for more than 8 hours. In some cases, mitigating actions (e.g., fire watches) may be required until the system is repaired or a new system is installed. If you are faced with a system replacement, be sure to bring in an experienced design professional. He or she can assist you with development of specifications, designs, and an ITM plan that will ensure a trouble free system for many years.

Implementation of a fire protection ITM program isn't difficult. There are ample resources to assist you in this effort.

For more information about our design, third party review, construction period services, and third party testing, please contact us at mwb@mertonbunker.com

Merton Bunker is chair of the NFPA Technical Committee on Protected Premises Signaling Systems and a former member of the NFPA TC on Testing and Maintenance of Fire Alarm Systems.

Upcoming Events:

March 15 & 16: NFPA 72 Inspection, Testing and Maintenance Seminar—St. Louis, MO

May 7—10: NFPA 72 Seminar—Nashville, TN

May 24 & 25: NFPA 72 Inspection, Testing and Maintenance Seminar—San Antonio, TX

