

The Importance of Proper Inspection and Maintenance of the Fire Alarm System

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The fire alarm system is quite possibly the single most important aspect of any building structure. Given the task of providing twenty-four hour a day protection for occupants, buildings and their respective contents, fire alarm systems are often overlooked until a problem occurs. The requisite testing and inspection that must be conducted to ensure the continued operation of these systems is often seen as expensive, time-consuming and unnecessary. However, you can't tell if a fire alarm system is operational by merely looking at it, or by performing a superficial check. Over time, the electronics and other components that comprise any given system degrade due to environmental factors (i.e. dust & dirt) as well as intentional abuse and improper test and maintenance actions. For such reasons,

it is necessary to implement and adhere to a thorough test and inspection maintenance program for all fire alarm systems in order to ensure continued protection and peace of mind for the building owner, knowing that he has fulfilled his obligation to his tenants.

The First Steps

Most fire alarm systems have a productive lifespan within a range of 10 to 15 years; however, these systems can last much longer and continue to provide dependable service when provided with proper maintenance and care. Any comprehensive test and inspection program should be based on a universally accepted standard by which to measure proper functionality of a fire alarm system. Obviously, the instructions for a system's installation, use and preventative main-

tenance, as put forth by the manufacturer, should be stringently followed. Additionally, NFPA 72-2002 National Fire Alarm Code is the benchmark for correct fire alarm system installation and operation, and it has been adopted in a large number of jurisdictions throughout the United States. In particular, Chapter 10 of NFPA 72 specifically covers the testing, maintenance and inspection of fire alarm systems. In Canada, ULC-S536-97, The Standard for the Inspection and Testing of Fire Alarm Systems is what is generally followed and enforced.

In addition to having an understanding of the codes, the service personnel performing the actual testing and maintenance of fire alarm systems must also be familiar with the systems they are testing, and ideally, be factory trained

and certified. Better still is certification by the National Institute for Certification in Engineering Technologies (NICET) fire alarm technician certification program, which is nationally recognized, and becoming increasingly required by more jurisdictions, as well as fire alarm system test and maintenance companies, as they continue a trend toward professionalism within the industry. Additionally, the test and inspection technician should utilize the most current technology and professional equipment available in order to thoroughly check the fire alarm system for any deficiencies. This is one area where shortcuts cannot be taken, as the consequences of a poorly maintained system can be devastating to the building, the building owner and occupants alike.

Inspection of the System

Prior to any actual testing being conducted on the fire alarm system, a thorough inspection must be done. This may be done by visually looking for problems that should be fairly obvious, such as missing or damaged devices, improper device locations and the use of non-rated components, and any deficiencies found should be documented. Any original drawings of the system should be reviewed in order to ascertain where all of the equipment is located. Other documentation, such as specifications and any operational manuals should also be located so that a comprehensive analysis of the system may be made before any actual testing is conducted.

A recent trend in documentation, which is becoming increasingly popular both with Authorities Having Jurisdiction (AHJ) and customers alike, is the use of test and inspection software. This typically provides for less paperwork to sort through afterwards, and also allows the testing company to keep a database of their own records that is easily accessed in order to provide verifi-

cation of a service performed for a customer. Several software programs also feature signature capture capability, so there is even further proof of testing and inspection of the fire alarm system, which many AHJs prefer over a hand-written paper form.

System Testing

Prior to any test of a building's fire alarm system, all occupants should be notified, in accordance with NFPA 72 section 10.2.3.1. This ensures that everyone is aware of what is going on and the testing can be conducted that much more efficiently. Typically, a two (2) -man team performs testing of a system, with one technician remaining at the panel to report what device or zone is activated. This allows for greater accuracy. Although with smaller systems, one technician may be sufficient.

While most system manufacturers recommend an annual test and inspection (after the initial acceptance test), other agencies and local authorities both recommend and even mandate testing intervals. NFPA 72, Chapter 10, which specifically deals with inspection, testing and maintenance, includes a table that provides the recommended testing intervals for the various components encompassing a fire alarm system, including, but not limited to, batteries, generators, initiating devices and interface equipment. Section 10.4.3 provides frequency requirements for periodic testing of all fire alarm system components. Frequency of testing varies depending upon the system component; however records must be kept to ensure that testing was done within the required frequency.

Among the first components to be tested are usually the initiating devices and alarm sensors, such as smoke detectors and heat detectors. These should be tested in accordance with the manufacturer's requirements. When testing smoke detectors, it is imperative to per-

form a functional test to ensure that there is actual smoke entry into the sensing chamber. It is certainly not enough to perform a "magnet test," or an electrical stimulation of the detector. The synthetic aerosol smoke that is used should be approved by the manufacturer as well as listed with an accepted approval house (UL, FM etc.). Ideally this smoke should also be of a non-flammable formulation due to concern over the possibility that certain operations/electronics within the detector and its base could cause ignition of a flammable aerosol test product. Additionally, care should be taken to avoid spraying directly into the sensing chamber, which can be a cause for detector malfunction later on.

Heat detectors should be tested according to NFPA 72, Section 10.4.3.4.1 (if of the restorative type) with at least 2 per circuit being tested annually, with all heat detectors being tested at least once per five years. Non-restorable heat detectors are never tested in the field; however a representative sample must be tested and replaced after fifteen (15) years. Whenever heat detectors are tested one should utilize an instrument that produces heat safely (not using a live flame or otherwise).

When a sensitivity test is required of a smoke detector (NFPA 72 Section 10.4.3) there are several portable test devices that are available and approved by the major detector manufacturers. Detector sensitivity can and does drift. Over-sensitivity leads to false alarms, while under-sensitivity leads to late alarms or no alarms at all.

One often neglected area of system testing and inspection is duct detectors. Duct smoke detectors require tests to ensure smoke entry into the sensing chamber in the device. Often, these types of detectors are equipped with test switches that test the circuitry of the device, but this should not be accepted as a true functional, smoke-entry test.

Additionally, after all system inputs and annunciators are tested, the testing activities themselves must be coordinated with the system monitoring company or fire department in order to ensure proper communication between the building's fire alarm system and the monitoring company. Upon completion of the testing, the fire alarm system must be immediately restored, and building maintenance and supervisory personnel notified.

Maintenance and Documentation

Upon completion of system testing, there are often deficiencies that are found. While these must be corrected immediately, if possible, sometimes this cannot be done right away. However, it is incumbent on the building owner to ensure that the system is fully operational within a reasonable period of time. Most preventative maintenance is often easy to perform. Depending on the environment in which the equipment operates, it can consist of simply blowing the smoke detectors out with compressed air to more frequent and

intensive cleanings based upon location. In the end however, the technician should always follow the manufacturer's recommendations in order to be completely sure that proper maintenance is being performed.

Upon completion of system testing and maintenance, the servicing organization must complete figure 10.6.2.3 of NFPA 72 and leave it on site with the building owner or his duly authorized representative. The AHJ may request a copy of all test, inspection and maintenance forms at any time. It is therefore imperative that the required documentation be kept available at all times. In addition, the owner must retain records of inspection, testing and maintenance for the life of the system.

Final Thoughts

As stated in the opening paragraph of this article, the fire alarm system is very likely the single most important system in any given commercial building. It is called upon to protect all that we consider valuable. Most times, it is never thought of, or called upon at all. Yet, it

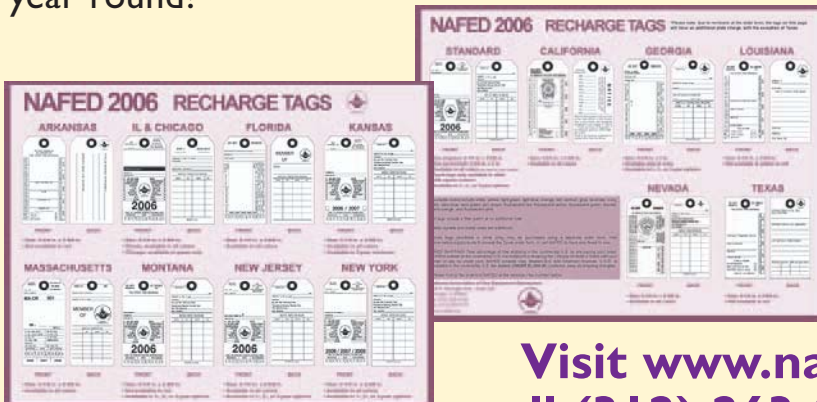
is all too often that we read of catastrophes that were caused by an ineffective or inoperative fire alarm system. In fact, with proper care and maintenance, many of these catastrophes could have been averted. It is often the case that when budgets are cut, among the first areas to suffer are those which do not normally first come to mind. However, it has become increasingly apparent over time that such actions are both foolish and costly. The building owner is liable for the protection of his occupants, and as such has the obligation to inspect test and maintain the fire alarm system (NFPA 72 Section 10.2.2.1). Most importantly, the simple fact is that fire alarm systems save lives, and their proper operation should be of the highest priority. ▽

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