

▶ *Hanover Risk Solutions*

Inspection, Testing & Maintenance of Life Safety Systems

Life safety systems are building components and systems that help protect building occupants during fires and other emergencies. In order to provide the level of protection they were designed for, these systems need to be inspected, tested and maintained on a regular basis.

This document summarizes some of the important recommendations of the National Fire Protection Association (NFPA). The primary NFPA code addressing life safety is NFPA Code 101, also known as the Life Safety Code®. NFPA 101 refers to several other NFPA codes for further details. The maintenance recommendations summarized here are not all-inclusive, but address some of the issues commonly encountered by Hanover Risk Solutions Consultants.

Additional details and any further requirements should always be obtained from the manufacturer of your specific equipment and your local fire official.

In general, the term “inspection” refers to visual checks of the system, “testing” refers to functional or operational tests and “maintenance” refers to repair or replacement of components. Inspection, testing and maintenance is often abbreviated as ITM.

Fire Alarm Systems

Fire alarm systems are composed of the following components: initiating devices such as smoke detectors and manual pullboxes, occupant notification appliances such as horns and strobe lights, an annunciator panel, batteries for backup power, and a control unit that ties everything together. Some fire alarm systems interface with other building systems, for instance being initiated by sprinkler waterflow or causing fire doors to close or elevators to return to the ground floor. Most fire alarm systems also have a connection to an offsite central monitoring station or fire department.

Each of these individual components must be inspected, tested and maintained. ITM requirements for fire alarm systems can be found in NFPA Code 72.

Due to the complexity of fire alarm systems, they should receive ITM at least annually by a qualified contractor. An extensive list of items to be checked and forms for documentation are found in NFPA Code 72. You should confirm that your fire alarm contractor is following this code, as well as the recommendations of your alarm system manufacturer.

There are several items that must be checked more often than annually. Some building owners will have their alarm contractor make these additional checks, and others will have their maintenance staff perform them (with proper training). Due to the number of items to be checked semiannually, many building owners contract for semiannual outside inspections. The following are examples of the additional inspections outlined by NFPA Code 72:

DAILY

- Confirm integrity of central station alarm connection if provided (this is often done automatically)

WEEKLY

- Inspect alarm control equipment (if alarm, supervisory and trouble signals are not monitored offsite)

MONTHLY

- Inspect traditional (flooded) lead-acid and dry cell backup batteries
- Test any engine-driven generators used as a backup power supply

QUARTERLY

- Verify no obstruction of any "line of sight" detectors such as flame detectors
- Check any supervisory signal devices and waterflow devices used for initiation of the fire alarm system (such as sprinkler valve tamper and sprinkler waterflow devices)

SEMIANNUALLY

- Check for trouble signals on alarm panel, even if these are monitored offsite
- Verify condition of annunciator panel
- Inspect all other initiating devices (other than "line of sight" detectors, supervisory signal devices and waterflow devices as noted above)

- Inspect all notification appliances
- Check transient suppressors on power supply, e.g. voltage surge suppressors
- Perform load voltage test of backup batteries (all battery types)
- Inspect sealed lead-acid and nickel-cadmium backup batteries
- Test specific gravity of traditional (flooded) lead-acid backup batteries
- Check any equipment interfaced with the alarm system such as elevator recall and guard tour "clock" systems
- Confirm condition of in-building fire emergency voice/alarm communications and mass notification systems if provided ("mass notification" systems are similar to fire emergency systems but can also be initiated by other types of emergencies)
- Test any flame detectors, spark/ember detectors or waterflow devices used for initiation of the fire alarm system (this is an operational test as opposed to the visual inspections noted above)

Smoke Alarms and Carbon Monoxide Alarms

Smoke alarms and carbon monoxide alarms are different from the fire alarm systems described above, in that they contain detection and warning devices together in the same piece of equipment. Smoke alarms and carbon monoxide alarms are self-contained units, while smoke detectors and carbon monoxide detectors are initiating devices in a fire alarm system and cannot operate independently. Smoke alarms and carbon monoxide alarms are commonly found in one- and two-family dwellings and within the living units of apartment buildings.

The ITM requirements for smoke alarms are found in NFPA Code 72, and those for carbon monoxide alarms are found in NFPA Code 720. Both of these codes require the annual testing of alarm units according to the manufacturer's recommended procedure. This procedure generally involves pressing a "test" button on the alarm unit, but could also require use of a specialized "test smoke" or carbon monoxide sprayed from an aerosol can. These annual tests should be performed by qualified personnel, not by residential tenants. Some manufacturers also recommend an additional periodic test of the sensitivity of smoke alarms.

Most manufacturers also recommend more frequent, less comprehensive testing of smoke alarms and carbon monoxide alarms, which can generally be performed by residential tenants. Building owners should provide tenants with written instructions on the frequency and method of performing these tests. These are generally accomplished by pressing a "test" button on the alarm unit, on a monthly or weekly basis as recommended by the manufacturer.

Smoke alarms, and combination smoke/carbon monoxide alarms, should be replaced when they no longer pass the tests noted above or 10 years from their date of manufacture, whichever is sooner. Carbon monoxide alarms should be replaced when they no longer pass the tests noted above or when they reach the date recommended by the manufacturer, whichever is sooner.

It is generally recommended that battery powered smoke alarms and carbon monoxide alarms be replaced by hard wired units with a battery backup. Another option may be to install a fire alarm system that uses

battery operated low-power radio (wireless) detectors. This type of detector transmits a radio signal to the central control unit when its battery is running low.

If it is not immediately feasible to replace battery powered smoke alarms or carbon monoxide alarms, the monthly tests noted above should be performed by the building owner and be documented, rather than being performed by the tenant. Batteries should be replaced semiannually or as recommended by the alarm manufacturer.

Emergency Lighting

ITM requirements for emergency lighting equipment are found in NFPA Code 101. Each emergency lighting fixture is required to be operationally tested for at least 30 seconds, at least once every 30 days. During this test, it should be verified that the bulbs are operational and properly aimed. In addition, it is suggested that each battery operated fixture be tested for 1 ½ hours at least once per year. Self-testing/self-diagnostic emergency lighting equipment is available for automation of these tests.

Batteries used to power emergency lighting fixtures should receive ITM per the manufacturer's instructions. If a central battery system is used, rather than individual battery packs on the fixtures, a weekly ITM schedule should be established as detailed in NFPA Code 111.

For emergency lighting that is powered by a generator, the annual 1 ½ hour test noted above is replaced by more extensive operational testing outlined in NFPA Code 110. Some of the ITM requirements in NFPA 110 include:

WEEKLY

- Inspection and scheduled maintenance of generator per manufacturer's instructions
- Inspection of generator starter battery

MONTHLY

- Specific gravity test for traditional (flooded) lead-acid starter batteries
- Exercising of generator under load, with the duration and loading dependent on various conditions outlined in NFPA 110
- Operation of transfer switch

QUARTERLY

- ITM of transfer switch as detailed in NFPA 110
- Load test of generator starter battery

SEMIANNUAL

- Exercising of circuit breakers

ANNUAL

- Fuel quality test of generator fuel
- Thermographic inspection of transfer switch

BIENNIAL

- Simulated overload of circuit breakers

Lighted Exit Signs

Exit signs must be illuminated per the specifications in NFPA Code 101. Various options are available:

- Illumination by the regular building lighting (this may be the only source of illumination if the building is not required to have emergency lighting)
- External illumination by emergency lighting fixtures
- Internal illumination by emergency lighting fixtures built into the signs

- Self-luminous signs, powered by a low-level nuclear radiation source
- Photoluminescent signs, which absorb and re-radiate light from the regular building fixtures

All of the above types of exit signs have some common ITM requirements: they must be physically present, clearly visible, indicating the correct direction of travel, and adequately lighted under non-emergency conditions.

Exit signs can often become damaged over time, removable sections can fall out and therefore indicate an incorrect direction of travel, and signs can become blocked. Regular (non-emergency) lights near the signs can also burn out or be accidentally turned off. All types of signs require adequate illumination levels during non-emergency situations. For photoluminescent signs this is especially important, since they will not "glow" with adequate brightness if they do not receive sufficient light during non-emergency periods.

All of the above items should be inspected on a regular basis, for instance as part of a daily pre-opening inspection of the building. Even if the building is continuously occupied rather than being opened and closed each day, periodic self-inspections should be performed at least monthly.

For signs that are internally or externally illuminated by emergency lighting fixtures, the ITM program must also include the emergency lights as outlined in the previous section.

Door Self-Closing Hardware

Doors in fire walls and smoke barriers are required to be self-closing, and if they are the latching type, self-latching as well. Self-closing hardware and latches can easily get out of adjustment or break, and doors are often propped open by building occupants. Therefore, it is important to include fire and smoke doors in your ITM program.

Fire and smoke doors should be tested for proper operation at least annually, or more often depending on their level of use and abuse. For instance, doors that are often propped open by building occupants may need to be inspected daily. Ongoing problems with propped doors may need to be addressed by adding magnetic hold-open devices that are released by smoke detectors.

ITM requirements for fire and smoke doors can be found in NFPA Code 101, NFPA 80 (fire doors) and NFPA 105 (smoke doors). Also see www.hanoverrisksolutions.com for further information about Fire Door Inspection Programs.

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