Session No. 666

Life Safety Inspections

R. Craig Schroll, CSP, SFPE
President
FIRECON
East Earl, PA

Introduction

This session will review several key elements that must be part of life safety inspections in all of our facilities. Good and bad examples are used throughout the presentation to illustrate items that should be evaluated during a life safety inspection.

Learning Outcomes:
List the fundamental principles of life safety from fire.
Identify key components to evaluate during an inspection.
Differentiate between correct and incorrect status of inspection items.

Our facilities should offer occupants a reasonable degree of safety from fire and other emergencies. While we work hard to prevent fires and other emergencies that might threaten occupants we must be prepared to protect them from these events.

National Fire Protection Association (NFPA) 101® Life Safety Code® is one of the best standards to use as a guide in accomplishing this important task. The NFPA Code may or may not carry the force of law in your jurisdiction. This session is not strictly code based.

We have a long sad history of having to learn life safety lessons repeatedly. These lessons are paid for with lives lost. We will look at several critical life safety issues that can help ensure that people are not killed in your facility.

Fundamental principals

Defense in depth is a key concept for any process where reliable performance is essential. This means that we should avoid counting on one measure to handle the entirety of an issue. Where critical performance is needed multiple approaches should be applied so that if one does not work perfectly at the time of the emergency the other can still offer protection.

The appropriate measures to ensure life safety in a building depend on a number of factors. The size and layout of the building will impact what is needed. The occupancy type is a

major consideration. The number and type of occupants will also play a role. What fire protection features have been installed will influence life safety.

With a few exceptions, most areas require two exits. This is to help ensure that at least one exit will be available during an emergency. Two exits does not mean only two doors or door panels. To count as two separate exits the doors must be far enough away from each other so that they are unlikely to both be compromised by a single emergency.

Occupants must have clear unobstructed access to exits. All of the paths that a person may have to travel need to provide a safe continuous path that leads out of the building and eventually to the street outside. Items placed in front of doors or that obstruct corridors are only part of what we need to look at. Walking surface condition, handrails in stairs, overhead clearance, and many other items must also be examined.

Exits must be in operating condition. The components of doors must function properly. Panic and fire exit hardware must release as designed. Delayed egress and access control arrangements must work properly to release doors.

The path to an exit and the exit must be clearly identified. Exit signs must be provided in appropriate locations so that occupants are guided to exits. Exits themselves must be clearly distinguishable.

Occupants must be able to see to travel to the exit. Normal and emergency lighting must be adequate. All portions of the means of egress must have sufficient lighting for people to see.

Occupants must be made aware of emergencies so they can take appropriate action. Detection and alarm systems are an important part of life safety. Evacuation communication systems can significantly improve your ability to help people take appropriate actions during an emergency.

Building construction and protection should allow occupants adequate time for escape. Compartmentation can slow the spread of fire and smoke increasing the survivable time in the facility. Suppression systems make a major contribution to life safety.

These basic items do not sound complex and generally at the fundamental level they are not. Ensuring that all these items are in place in our facilities on an ongoing basis requires that we maintain constant vigilance though. During the course of one year there are 525,600 minutes of opportunity for one or more of the critical issues to be compromised.

Key components to Evaluate during an Inspection

Maintaining the readiness of our facility requires that we frequently inspect. You should regularly walk the exit pathways of your facility both inside the building and outside. The complete egress path is made up of the exit access, exit, and exit discharge. All three portions that occupants might have to travel during an emergency must be ready at all times.

Begin your inspection process without assumptions. In the early phases of evaluating your facility, it is a mistake to assume that it complied with codes and standards the day it

opened. I have been in numerous facilities over the years that were not correct from a life safety perspective from the beginning. Also do not assume that because the authority having jurisdiction (AHJ) signed off on the plans and the facility that it is properly designed for life safety.

With few exceptions two exits are required from areas where people may be in your facility. Exceptions include individual offices and individual sleeping rooms in hotels, motels, or dormitories. The number and position of exits will vary based primarily on the occupancy of the building. For example, an assembly occupancy requires more exits than a warehouse. The size of exits and travel distance to them also varies by occupancy. Travel distance is permitted to be longer in sprinklered buildings.

Locked, blocked, and otherwise compromised exits are almost routine occurrences in many facilities. We must constantly evaluate exit pathways and exits for obstructions that may impair their use during an emergency. You may find simple issues such as items stored in front of a door or in a stairway. You may also find more complex items such as modified locking arrangements and malfunctioning release mechanisms on delayed egress or access controlled doors.

Less obvious than the problems mentioned above are many issues that can compromise the functioning of an exit. For example, corrosion of a metal door to a metal frame can make it impossible to open but based upon visual observations alone would not be discovered. You must periodically walk down your exit pathways and actually confirm the proper function of all components. The swing feature on powered sliding doors must be tested periodically to ensure it will function correctly.

Exit signage must be in place throughout your facility. Signs are used to help guide people to the nearest exit. They must be readily visible during normal and emergency lighting conditions. Signs should be spaced no more than 100 feet or the maximum listed viewing distance of the sign whichever is less. They must be illuminated internally, externally or via photoluminescent means. Any door that may be easily mistaken for an exit but is not one must be labeled “Not an Exit”. Directional arrows on exit signs should indicate the shortest route of travel to an exit. Low level signage is required in some occupancies.

The position and illumination levels of exit signage should be checked regularly. Stored power illuminated signs need to be tested briefly every month and for the full 90 minute operating time annually.

Emergency lighting is critical to a successful evacuation if normal power fails. The position of emergency light units and the direction of beams must be checked. Self contained stored power units must be operated with the test button for 30 seconds on a monthly basis. They must be given a full operational test for 90 minutes annually. Self diagnostic units are available that eliminate the need for these test to be completed manually. The annual test should be completed by removing normal power from the lighting circuit in the area to confirm that the lights are properly wired.

The primary role of fire protection features and systems is to lengthen the time available for occupants to escape. Fire protection features and systems must be regularly inspected, tested,

and maintained to ensure they function effectively during a fire. NFPA 72 National Fire Alarm Code® is the best guide for detection and alarm systems. NFPA® 25 Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems is the best guide for water based suppression systems. There are numerous other NFPA codes and standards that can help you with requirements for inspection.

Detection and alarm systems require an extensive amount of inspection, testing, and maintenance. This should be set up as a separate process in your facility to ensure that all requirements are met. During life safety inspections you should look for obvious issues with these systems though. Items such as compromised detectors or obstructed pull stations are examples of items that should be caught and corrected as part of our inspection process.

Compartmentation is an important but easily defeated part of life safety. A common and serious example is blocking open a fire door to a stair tower. Breaching rated construction and not properly sealing the opening is another all too common example.

Suppression systems have a major positive impact on life safety. The historical record is clear. People seldom die in sprinklered buildings. The key to this is that the systems must be properly designed, installed, inspected, tested, and maintained. The concept of these issues is simple, putting them into practice may not be.

While your systems may have been in place for many years, a good place to start an inspection process is to double check the initial design. Too often there may be problems that existed with the system since the day it was originally installed. I recently discovered a check valve on a system that had been installed backwards. This prevented water from flowing in the desired direction. The system had been in the building for several years but no one had previously discovered or corrected the problem.

One of the most common design issues is that the flow rate is not correct. This can be the result of initial design mistakes or a change in hazard.

Incorrect head positioning is a common installation error. Piping problems can also be found. How piping is installed can have a significant impact on the hydraulic performance of the system. These problems are magnified if water supply is marginal.

Routine testing of water based systems according to the requirements of NFPA 25 are critical to the effective performance of the system.

We must constantly look for problems with our systems. Common items you will find on inspection include clearance issues below sprinkler heads because of items being stacked too high on storage shelves. Obstructions created by minor changes in an area are also common. The simple issue of moving a cubicle wall a few feet may impact the distribution pattern of a sprinkler. Most building occupants give little if any thought to the sprinkler system and will generally not realize the significant impact of these items.

You must routinely check for changes in your facilities that may impact life safety. Changes in use, remodeling that impacts egress pathways, and many other items can change an area from one where life safety was adequately addressed to one where problems exist.

You should ideally be notified of and involved in changes to the facility that may have an adverse impact on life safety. Enlisting your personnel to help prevent and correct problems with life safety will contribute to sustainable improvements over time.