

Intelligent **fire detection** and **alarm** systems in public buildings

A complete guide

Addressing existing *vulnerabilities* within the building and prioritizing *security measures* that mitigate possible damage caused by a fire are two significant factors in preventing large losses.

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Introduction

Municipal buildings, including city halls, parks department headquarters, public works headquarters, police and fire stations, critical utility infrastructures, municipal parks, community centers, and sport complexes across the U.S must be duly prepared to successfully face the potential event of a fire. Addressing existing vulnerabilities within the building and prioritizing security measures that mitigate possible damage caused by a fire are two significant factors in preventing large losses and increasing survivability of occupants and emergency responders.

Efficient fire prevention products are accessible and affordable for the public sector. Must have solutions are fire detection and alarm systems, in conjunction with fire suppression technologies. These systems should be adequately installed and rigorously maintained by security professionals in order to increase the safety of people and reduce property and asset damage.

Modern solutions vary in complexity. Therefore, a comprehensive assessment of the specific characteristics of the building must be carefully conducted to determine security gaps and opportunities unique to the institution. However, typically, the best course of action for most buildings is to accurately identify the incident, timely notify occupants of the emergency, alert emergency responders, and combat fire with capable fire-suppression technologies

Fire is one of the most serious threats against public institutions due to its speed and potent destructive power. In addition, state, local, and municipal agencies often house important — and even irreplaceable — items that must be protected. Luckily, there are a myriad of solutions that can provide the government establishment with the tools it needs to prevent and fight the flames and minimize adverse effects due to a fire.

Best practices for successful fire protection

Although it might seem unlikely, the risk of a fire is far from an impossible occurrence. The annual average data from 2014–2018 resulted in 18,972 fires, 15 deaths, 282 injuries, and a total of \$849,120,202 in property losses in office buildings, as reported by the National Fire Protection Association (NFPA).

Having a solid protection plan can reduce the chance of death, injury, and property damage. Being aware of the risk of fire and taking the necessary steps to diminish the chance of incidence is fundamental to ensure high levels of security in the governmental institution.

These are some of the best practices that should be exercised by the public entity to have better layers of protection against fires.

- **Plan:** The agency should have a formal document describing the fire hazards in the building and the protocols to follow to prevent a fire emergency. This plan should be always followed and made available to all employees.
- **Housekeeping:** Habitually cleaning spaces is an integral part of preventing a fire. Getting rid of flammable materials accidentally thrown and keeping corridors and emergency exits clear is important.
- **Evacuation plans and drills:** Outlining to employees how to act in case of a fire and practicing possible emergency scenarios.
- **Deployment of fire protection equipment:** Fire detection sensors, alarm systems, and fire suppression technologies.
- **Continuous update of new fire policies:** All occupants in the building should be familiar with the latest fire prevention policies and regulations.
- **Fire extinguisher training:** Hands-on training on how to properly use a fire extinguisher should be provided to employees.
- **Maintenance:** Routine maintenance and testing of fire protective equipment is mandated by the NFPA. In addition, non-functioning devices should be promptly repaired.

FIRE PROTECTION VS. FIRE PREVENTION

Protection and prevention are an integral component of reducing downtime at a public institution. Regarding fire, proper protection uses tools and procedures that maintain the safety of the building and reduce hazards associated with fires. On the other hand, fire prevention requires proactive inspection, testing, and maintenance of the systems being implemented to effectively address the event of fire.

Fire protection includes fire suppression systems, alarms, sensors, mass notification systems, fire extinguishers, fire hydrants, access control, and video surveillance.

Fire prevention involves regular risk assessments, adherence to fire regulations dictated by the NFPA, regular drills, maintenance and repairs.

These are a few of the most important detectors to deploy in a public building:

Heat detectors. Have less chance of triggering false alarms and are affordable. They work best in scenarios where rapid fires occur in small spaces. They are a wonderful option, especially if combined with smoke detectors into a single unit, allowing for detectors to be activated when any of those conditions (heat or smoke) are present.

Smoke detectors serve the purpose of early detection and notification, allowing for a rapid reaction. They are often preferred to heat detectors because they sense the presence of fire much more rapidly, which can mean the difference between a safe evacuation or great loss of life. Some factors that can affect their performance are type and amount of combustibles, environmental conditions — mist, normally occurring smoke, and high humidity — and rate of fire growth.

Flame detectors are sensitive to the light waves emitted by fires. They are normally operated by UV (ultraviolet) or IR (infrared) energy and operate promptly. They should be placed in locations where fires are likely to originate as they need to “see” the flame to detect the fire. False alarms might be an issue as flame detectors might confuse sunlight with flames.

Alarms and communication systems

In order to facilitate a timely notification to building occupants of a fire, fire alarm and intelligent communication systems are required. They are capable of warning people of abnormal conditions, for which they should take proper action, as explicitly outlined by a fire protection plan. In addition, they can request assistance from first responders, control auxiliary building fire devices, and provide detailed information, like event location, smoke movement, and status of fire prevention devices.

Systems differ in intricacy. A basic structure might consist of a control panel, initiating devices, and notification equipment that is able to transmit a general alarm throughout a building. More sophisticated options may include voice evacuation systems with integrated fire department communication capabilities and two-way communication features.

ELIMINATING THE RISK OF FALSE ALARMS

A false alarm —the alarm that does not result from a hazardous or emergency condition — is undesirable. Primarily, they misuse the vital services of the local fire department. In addition, they desensitize occupants to alarm signals. False alarms can be categorized in malicious and unintentional alarms. Efforts to deploy equipment that reduces the risk of getting these types of alarms should be made to keep fire service responses to a minimum and firefighters available for actual emergencies.

Smoke detectors normally have an adjustable sensitivity feature that can help alleviate the false alarm issue. This sensitivity should be set to the lowest level in high-traffic areas like the lobby and corridors of the government building. However, smoke detectors can also confuse smoke and get unnecessarily activated when there is excessive moisture or atmospheric particles, such as dust. Consequently, fire protection system designers and decision makers should be cognizant of the normal activities and environmental conditions that happen in any given protected area when choosing fire detection devices.

OCCUPANT NOTIFICATION

When a fire arises in a building, notifying occupants is imperative to ensure they take the proper precautions and reaction. The notification should also be audible and visual – for occupants who are blind, visually impaired, or hard of hearing. In adherence to the Americans with disabilities Act (ADA), it is important that leaders ensure all occupants are promptly notified in a way that is accessible and comprehensible.

Since all occupants in a building must be notified in some manner, audible and visual indicating devices can guarantee every individual gets emergency messages. Moreover, people with no disabilities could benefit too by confirm the veracity of alarms when receiving both signals. These should be displayed in an on-off rather than in a steady, constant manner, e.g., flashing lights, strobes, “march time” sounds.

Voice alarm systems can be opportune to facilitate communication between first responders and functionaries in the building, in special scenarios, as they can allow authorities to send selective voice evacuation messages to occupants. These messages can be prerecorded or done live by properly trained staff. When a general evacuation is impractical voice alarm systems are a valuable tool.

The system also allows firefighters to override prerecorded alerts and broadcast live, based on the specific conditions of the fire and building. The dynamic capabilities of selective evacuation, message replacement, and live communications are ideal to answer and adapt effectively to serious fire emergencies.



MASS NOTIFICATION SYSTEM

A mass notification system in a governmental facility is an integral solution that helps provide emergency communications to a large number of people on a wide-scale basis. The messages can be specifically directed to the staff of the building and the solution can be easily integrated with an emergency communications system. When the risk of a fire is a possibility — and it always is — adopting a modern system that meets the requirements of the public institution is extremely important.

A solid solution that connects the entire organization during the emergency is priceless, especially at times when reliable, and precise communication is critical to save lives and property. Moreover, ensuring business continuity is feasible when the entity has the right tools to inform personnel of the status of the fire emergency.

Two-way communication is also a possibility with an advanced mass notification system. As leaders need to know the status of their functionaries during an event, having access to employees' messages and survey responses, detailing who is safe or in need of help, is vital to ensure all occupants are okay, and if they are not, make certain they receive prompt assistance.

Other capabilities include:

- Real-time insights of messages delivered.
- Sharing important updates and resources as the emergency unfolds.
- Monitoring the building by zones.
- Automatic notifications
- Mobilization of coordinated response.
- Variety of channels (text, email, mobile app notification, voice call, desktop, and social media).

Fire suppression

Fire suppression and extinguishment should be considered a part of a comprehensive fire protection plan. The science of life safety is based upon the fire triangle, which indicates that three conditions should be present for combustion to occur: fuel, heat, and oxygen. If some of these factors is removed from the equation, with a fire suppressor, then the combustion ceases to exist, and life can be protected. In addition, fire can be put out by interfering with the complex chemical reactions that take place during the combustion process.

Some of the most common fire suppression agents are:

Water

Although it is the most common fire extinguishing agent used, it has several limitations. The advantage of using water is that it can extinguish fire by cooling the fuel below the temperature at which it can produce flammable vapors. Water can also extinguish by smothering, dilution, and emulsification. It is also relatively cheap and mostly available. The limitations, however, are that it is extremely heavy, it conducts electricity, it can damage property, and it can freeze. However, these weaknesses could be alleviated by including in it some modifiers, for example, foam solutions.

Carbon dioxide

CO₂ is a good fire extinguisher agent. Its relative high density is useful to cover the surface of a fire. The oxygen in the surrounding air physically separates from the surface of the fuel when using this agent. CO₂ gases are not recommended if people are present.

Halon

This agent is used for protecting electronic and electrical equipment. However, it is not as effective for extinguishing fires that have become deep seated. Halon extinguishes fire by interfering with the chemical combustion chain reaction. It can be a little bit more expensive but, it suppresses fires quickly, is noncorrosive, and leaves no residue, hence it is considered a “clean” agent.

PROTECTING LIBRARIES AND ARCHIVES EFFECTIVELY



Public libraries and museums house valuable and irreplaceable information and materials that need to be protected against fire. These difficult-to-extinguish items are also highly flammable and can be a great fire load. When decision makers choose the best fire suppression system for their building, it is important to consider an agent that is able to extinguish a fire without causing any damage to their assets.

Water, for instance, is not advisable for this type of public buildings as it can cause irrevocable damage to library and archive collections. Automatic fire-suppression solutions, designed to rapidly identify and extinguish a fire, utilize halon as it is colorless, odorless, and non-toxic and can effectively suppress a fire while still protecting all materials.

Importantly, it does not damage items by leaving a residue on them and does not require extensive cleaning. Halon automatic fire suppressors might also be a valuable alternative for city halls, court houses, and police departments as they also house critical documents and information.

Fire protection and security conflicts

Although both fire protection and physical security strive to keep people, property, and assets safe, while ensuring operational continuity, there is a growing potential for code compliance conflict between these two critical disciplines.

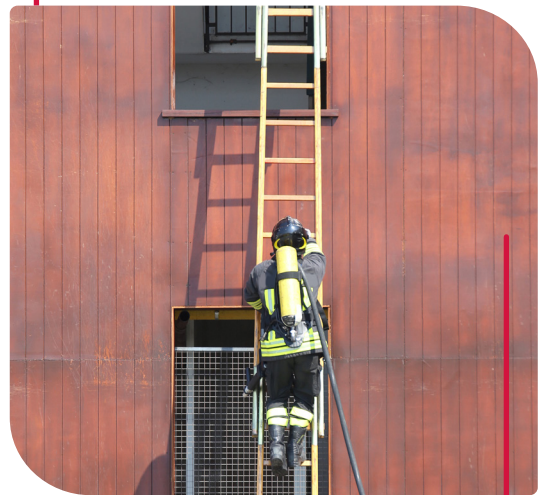
In the case of fire protection, the fire triangle needs to be considered to identify potential sources of fuel within the public building.

Further, a robust fire protection system, supported by the latest technologies, should be implemented. This system is expected to resist the heat, prevent the spread of fire, and control the smoke until the fire department arrives. Hence, professionals in charge of the fire protection program want free and open access to the building for first responders to assist with maximum efficiency and speed.

The principle of physical security, contrastingly, is to control access to individuals at all times, to diminish vulnerabilities, and to delay an aggressor's criminal activity, providing security teams with sufficient time to respond suitably against a threat.

The conflict between allowing unrestricted access to firefighters while controlling access to criminals could be alleviated by installing first-class solutions that detect fire in its earliest stages, before it turns into an emergency of bigger proportions, requiring the need of help.

In addition, fire fighters could be provided with specific information on where and how to safely and rapidly enter the building to ensure the integrity of the building is still protected when they assist. Finally, synergism between the fire prevention/ protection and security teams could lead to improving response times and diminishing fire damage, while still controlling the access of the building to keep its occupants safe from external threats.



Conclusion

In the particular case of a fire, the likely devastation, loss of life, and financial toll produced by it, requires decision makers to put into operation impermeable fire protection and prevention plans. The first one is implemented with the purpose of timely detecting fires and mitigating their harmful consequences. The latter requires continuous maintenance, testing, and inspection to ensure systems are reliable and usable during a fire emergency.

Advanced equipment that accurately detects fire and notifies the proper authorities and leaders is at the core of the plan. Different sensors able to detect heat, smoke, and flames provide an important layer of protection and allow leaders to safeguard their premises. Detecting a fire in its early stages, with the help of smart sensors, is invaluable and could prevent tragic outcomes.

Likewise, a robust alarm system is necessary. Warning or informing employees and visitors of fire, on time, lets them know which appropriate action should be taken to protect their lives. Whether it is sheltering in place, relocating to a safer area, or evacuating, all occupants must be aware of dangerous conditions that could potentially affect them. An effective alarm system is also able to summon assistance from fire service, building fire wardens, staff responders, and maintenance personnel, when required, and provide them with intelligence information such as fire location, smoke movement, and status of building and its occupants.

Fire suppression products, in addition, are an important factor to control fire. Extinguishing fire by suppressing one of the components of the fire triangle is a must when this incident occurs. However, depending on the type of public agency, the suppression agent should be chosen carefully. Libraries, archives, courts, and police departments store important documents and resources that need to be protected not only against a fire but also against the effects of an unfit suppressor.

Major several innovations in fire prevention technologies procure government facilities with the necessary tools to mitigate the damage of a fire, reduce downtime of operations, and very importantly, protect the lives of those in the building. However, the first step to achieve an acceptable level of protection is to become aware that fires are always a likely threatening possibility that needs to be strategically addressed with proactive choices and advanced technologies.

Contact your local office today for an on-site, no-cost security assessment.
For more information call **800.261.2041** or visit security101.com