Fire Alarm Systems in Historic Places of Worship

A three-story church burned for two hours before it was discovered by a passerby at 4:33 p.m. The fire was determined to be caused by an electrical source in a storage room which spread into the ceiling/floor space above and up through the church. The loss was estimated to be $2.5 million. There was no automatic detection or suppression equipment. National Fire Protection Association 909

The primary functions of a fire alarm system are to indicate an abnormal condition such as fire, smoke, and/or heat and summon appropriate aid within or outside the building in order to protect life and property. The basic components consist of a control unit, manual fire alarm boxes, automatic heat or smoke detection devices, waterflow alarms for sprinkler systems, and audible/visual devices such as horns, bells, speakers, and strobe lights. The reliability of the system is essential since false alarms reduce credibility. The range of prices of these systems varies greatly depending on the size of the institution and the type of system installed. Fire detection systems are classified by the following categories:

Smoke Detection Systems

Smoke detectors give the earliest warning of an abnormal condition by responding to smoke particles produced by a fire. The two primary types of smoke detectors are the ionization type and the photoelectric type. Both can be installed as spot-type detectors which are located in various areas (or spots) within a building. Spot-type smoke detectors protect areas of up to 900 square feet depending on the ceiling surface conditions and the height of the room. The photoelectric detector is more suitable for a house of worship because it is better at sensing visible smoke. Line-type smoke detectors, or beam detectors, emit a beam of light which smoke will obscure and trigger. In this type of operation, smoke obscures the light beam emitted by a transmitter to a receiver. Beam detectors are beneficial in large areas with high ceilings, such as sanctuaries and auditoriums. These detectors are more easily maintained since they are usually placed on a wall rather than a very high ceiling. Aspiration-type smoke detectors provide a very early warning of smoke particles by the use of a fan that constantly draws air into a chamber through a network of pipes or tubes. This type of smoke detection is good for areas where valuable and/or irreplaceable documents may be stored. It is highly effective and the best type of detection if no sprinklers will be installed.

Heat Detection Systems

Heat detectors are not as responsive as smoke detectors, and they cannot detect small smoldering fires. There are three types of heat detection systems:

Fixed temperature detectors operate when the detecting element reaches a predetermined temperature. These detectors are manufactured in seven temperature range groups, and the proper detector is selected based on the highest ambient temperature of the room for which it is designed.

Rate-of-rise detectors operate when the room temperature rises at a rate which exceeds a predetermined value.

Rate-compensated detectors respond when the temperature of the air surrounding the detector reaches a predetermined level regardless of the rate of temperature rise.

Combination fixed temperature and rate-of-rise heat detectors are also manufactured. It is also useful to consider using a combination of heat and smoke detector components.

Notification

A local protective system works by having the smoke and heat detectors programmed to sound an evacuation alarm just within the protected premises - not at a remote or central station. This is dangerous because during periods when the building is unoccupied, an alarm signal will not be heard and the local fire department may not be notified immediately. For this reason, houses of worship should also have systems programmed to notify the fire department. There are several ways that this is accomplished:

A remote station signaling system connects the protected property directly to a local fire station.

A central station signaling system connects the protected property to an approved central station monitoring company, which is manned 24 hours a day to monitor the alarm signal and automatically notify the local fire department.

An emergency voice/alarm communication system can be provided to transmit pre-recorded or live voice messages throughout the building to evacuate the building's occupants.

Fire detection and alarm systems are classified by the method of operation. The most common type of fire alarm system is the conventional system. It provides basic alarm, trouble, and supervisory signal information. More modern fire alarm systems consist of microprocessor-based control system panels. Addressable systems can provide highly detailed information about the alarm condition because the location of each detector is given a separate "address." Wireless alarm systems are available where it may not be possible to install the electrical wires required for the other types of systems.

Installation

In New York State, a fire detection system must be installed, tested, and maintained by a licensed electrical contractor. A licensed fire protection engineer with an understanding of historic preservation can best design a fire alarm and detection system that both protects the building and maintains its historic integrity and character.

Please note that sanctuaries and other high-ceiling areas require special attention due to the possibility of smoke stratification and dilution. Care should be also be taken to avoid the occurrence of unwanted alarms caused by smoke-producing devices such as candles or incense.

Congregations often ask if smoke alarms can be bypassed during worship services to avoid these false alarms. Most fire departments are reluctant to meet these requests. However, the authorities may reconsider if an alarm signal is provided at a manned location which is capable of iniating the evacuation signal to the building's occupants.

All proposed rehabilitation projects, including fire protection system installations, should be discussed with local building and fire department officials especially important in areas where the local codes do not require such systems to be installed in an existing property. New York City and New York State codes require fire alarm systems in new places of assembly; however, neither code has a retroactive provision for historic or existing religious institutions.

Fire is a continuous, major threat to historic religious institutions. Congregations should take proactive steps to protect their buildings before a tragedy occurs.