

Insight: Automatic Fire Detection

Recognizing the Risk

Automatic fire detection can reduce the risk of fire loss to both life and property. And when interconnected to operate with an automatic fire suppression system, increased loss reduction and loss prevention are a likely benefit. An adequately designed, installed, and maintained system with monitoring can reduce risk by providing fast automatic notification to the local site and public fire department for expedited response reducing the physical property and business operations impact of a developing fire.

Effective automatic fire detection starts with selection and design of system devices and components based on multiple factors such as the expected type of fire and growth rate, fire and ignition source characteristics, planned function and interconnection, and working environment. For example, hydrocarbon fires burn rapidly and give off thick black smoke while hydrogen gas fires burn hot and fast with almost no visible flame and minimal smoke. Dusty environments may cause detector failure or false alarms. And while “common” smoke detectors are designed to effectively operate from fires involving “ordinary” combustible materials such as furniture, paper, and office décor while operating in clean building environments, special smoke detection systems are available for harsh environments and/or, for special hazards such as slow-growing electrical wiring fires typical of computer rooms.



The best-suited type of devices and systems for each application can be complex and not only involve engineering analysis but a cost-benefit review. As would be expected, typically the more complex the application, the more sophisticated the design and associated system costs. For example, heat detectors are typically the best choice for small, confined spaces where rapidly growing, high-heat output fires are expected. Flame, light, or spark detectors would be the best likely choice in areas where near-instantaneous fire propagation would be expected to occur (i.e., areas with flammable liquids and gases or explosive dust, etc.). And special gas detectors that monitor for fires in materials that burn with incomplete combustion and produce significant quantities of gases may be the best choice. Environment analysis when selecting and designing the right system also include factors such as building ventilation paths that could delay detector operation time and building temperature fluctuations. And complete analysis on new systems or additions has to include costs- being both initial costs and continued maintenance. Interconnected automatic fire detection devices also take special design consideration- such as when tied to special fire extinguishing systems and building smoke exhaust systems.

Controlling the Hazard

Installing and maintaining the correct automatic fire detection system must start with selection of best device and system followed by the correct installation and continued with acceptable inspections and testing through the life of the system. AIG follows National Fire Protection* (NFPA) 72¹ supported by added AIG recommendations specific for this hazard including the following:

- Design, install, and maintain all systems per NFPA 72* requirements including professional analysis of the goal of the fire detection system, type of hazards to be detected, the environment of installation and operation, and any applicable regulatory requirements. AIG may have added guidance for specific applications.
- Design all interconnected suppression and building systems per NFPA 72* in coordination with all other NFPA or equivalent related documents- such as NFPA 13² guidance for deluge sprinkler systems with NFPA 72* for the connected automatic fire detection system that activates the deluge system. AIG also offers an Insight on this topic.³
- Following all manufacturer instructions for installation, use, and interconnection.
- Ensure fire detectors and associated alarm equipment is listed or approved by a national recognized equipment testing agencies such as Underwriters Laboratories (UL).

- Review all devices to ensure they are listed or approved by a national recognized equipment testing agencies such as UL for compatibility and interconnection- such as the connection between control panels by different manufactures or connection active systems such as detectors connected to shut down ventilation fans.
- Verify specific selected fire detectors are installed and utilized in accordance with their testing agency listing / approval ratings for the type of fire to be detected and the gross area covered per unit.
- Where applicable, such as in locations with part time occupancy or corporate continuously occupied supervisory center, connect fire detection systems to a UL listed central station (CS) alarm company, BS approved Alarm Receive Center (ARC) or direct public fire department connection.
- Provide a program for system and device inspection, testing and maintenance per NFPA 72*- the best designed system will provide poor response if not regularly tested and maintained.
- Implement a management program (including financial planning) to facilitate the immediate repair of systems and components when damage or malfunction is found- recognizing all mechanical and electrical systems require routine maintenance and repair.

References & Resources

¹ NFPA 72, National Fire Alarm and Signaling Code

² NFPA 13, Standard for the Installation of Sprinkler Systems

³ AIG Insight: Automatic Sprinkler Systems

AIG Insight: Project Planning

AIG Insight: Video Surveillance Systems

AIG Insight: Warehouse Fires

*While NFPA documents are the global standard used by AIG, international equivalents may be acceptable.

For more information, contact your local AIG Risk Engineer.

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