4.0 Automatic fire detection and alarm systems

This guidance highlights the different types of automatic fire detection systems available and their uses.

RISK ADVICE LINE

Having read this guidance should you have any additional questions on this topic or other risk related matters, as a valued Ecclesiastical customer you can contact us through our 'Risk Advice Line' on 0345 600 7531 (Monday to Friday 9am - 5pm, excluding bank holidays) and one of our in-house risk professionals will be able to assist. Alternatively you can email us at **risk.advice@ecclesiastical.com** and one of our experts will call you back within 24 hours.

For queries about your policy cover or claims please contact your insurance broker.

Delays in discovering fires can be significant, leading to possible loss of life, significant damage to the building and impairment of the future activity of the organisation.

Automatic fire detection and alarm systems can be designed to protect occupants, property or both. The purpose of a system is to alert occupants to a fire having detected heat, smoke flames or gases. This enables the fire and rescue service to be called and modern sophisticated systems can advise the exact location of the fire.

Advanced systems can send a fire signal to an offsite alarm receiving centre and possibly connect to other systems to limit or extinguish the fire.

In heritage buildings, aesthetics are a consideration and systems can be designed with minimum invasive detectors. The system should be installed to include roof spaces and other accessible voids.

When heritage buildings are not continually occupied, it is advisable to install a remotely monitored system so that if an alarm activation occurs the Fire and Rescue Services can be alerted promptly.

For non-domestic buildings the system should be designed and installed to BS 5839-1: Fire detection and fire alarm systems for buildings. Further attention may be required if a predominantly domestic building includes commercial usage especially when providing overnight sleeping.

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Legal requirements

For non-domestic premises the Regulatory Reform (Fire Safety) Order 2005 requires a fire risk assessment (FRA) to be carried out. The FRA references the need to provide adequate means of escape and give adequate warning in the event of a fire.

The legislation, also requires that, if where fire alarm systems are installed, they must be checked and maintained to appropriate standards.

System categories

BS5839 -1 classifies fire detection systems for the protection of life into six categories:

Category	Details
M	No automatic detection. Reliance on manual break glass call point being operated that causes the alarm to sound.
L5	Detectors located to satisfy specific but limited safety objective e.g. release designated fire-resisting doors when a fire detected in the vicinity.
L4	Detects fires in escape routes only.
L3	Detects before entering an escape route e.g. detectors in rooms adjoining corridors and corridors.
L2	As per L3 and in addition provides early warning of fire in specified area of high hazard or risk.
L1	Provides total coverage of building. Automatic detectors installed throughout to provide earliest possible warning of fire.

Category P systems are intended for protection of property as follows:-

Category	Details
P2	Automatic detectors are installed in areas of high fire hazard where risk to property or business continuity fire is high.
P1	Involves installing detectors in all areas of the building. Aim of the system is to protect buildings that are critical to the operations of a business.

System types

For heritage buildings there are normally two types of alarm systems as follows:

- Manually operated alarm system. Sounders operate after a manual call point is activated upon discovery of a fire. This system is not suited for important historic buildings or if the buildings are left unoccupied for long periods.

- Automatically operated alarm system. These automatically alert via automatic triggers within the system. Normally, the system will signal to an offsite alarm receiving centre as soon as it's activated.

Fire detection and alarm system components

A system is made up of four major components as follows:

1. Detection devices

- Smoke detectors pick up the presence of smoke in the area of the detector. Photo-optical detectors are better at smoldering fires whilst ionization detectors are better at detecting flaming fires.

- Heat detectors can be fixed temperature type or rate of rise type that monitor air temperature in a defined area and provide an alarm if the temperature reaches a preset level. Heat detectors are generally used in kitchens, boiler rooms and areas where smoke detectors may be too sensitive.

- Flame sensors detect flames using infrared or ultraviolet omissions.

- Beam detectors transmit an infrared beam across a high level space to a receiver sensor. If the beam is broken by smoke particles the receiver triggers an alarm signal.

- Aspirating smoke detection (or air sampling) consists of a central detection unit that draws air through a network of pipes that detects and filters smoke particles before it is visible to the human eye. If smoke is detected an alarm is triggered and alerts the central detection unit. These devices are found in some heritage buildings as this device identifies early detection of smoke and the pipework can be hidden when installed.

- Carbon monoxide detectors sound an alarm when they sense a certain amount of carbon monoxide in the air over time.

- Multi Sensor detectors are designed to sense smoke, heat and or carbon Monoxide. These detectors help reduce false alarms by comparing the inputs from the multiple sensors before deciding whether the source of the input is an actual fire or from a false alarm conditions.

2. Manual call points (Break Glass boxes)

These devices are a key method of sounding the alarm after a fire is discovered. They are normally located next to fire exits where a fire extinguisher is sited. In some heritage buildings they are concealed by being flush mounted or installed inside cupboards or recesses if agreement is reached from fire authorities.

It is important staff are aware of the location of call points and fire safety training should include how to appropriately use.

3. Control panels

The panel provides power for the system and monitors detection devices. It indicates the location of an alarm alert, triggers output devices as below and monitors any system faults.

In some locations the main control panel may be in a location that is not readily accessible and an additional repeater panel may be required at the main entrance to the building. The fire alarm system should be located in proximity of the panel to assist fire and rescue services.

4. Output devices

These include devices such as sounders, strobe lights, voice alarms and links to an offsite alarm receiving centre.

Unwanted fire alarms

A significant proportion of fire alarm signals are classified as "unwanted" by Fire and Rescue Services. Normally they relate to human error or defective equipment. These alarms waste Fire and Recuse Services resources by diverting their services from emergencies, disrupt businesses and can remove user confidence in systems.

Unwanted alarms triggered by smoke detectors are often caused by cooking, making toast, insects, candles, open fires, steam, dust, aerosols, and a lack of maintenance.

Unwanted alarms in heat detectors are caused by high temperatures in the protected area or sudden increases in temperature. It is important at the system design stage to select the correct heat detector with the appropriate temperature limit.

To reduce the potential for false alarms we would strongly recommend that multi-sensor detectors conforming to BS EN54-29, 30 or 31 are installed.

Attention is needed when maintenance and construction work e.g. painting and decorating takes place and you should seek advice from your alarm installer. Whilst works are being carried out it may be sensible to protect the detectors with temporary covers and remove these at the end of the working day.

Key messages

- Early detection of a fire by automatic fire detection and alarm systems play a vital role in protecting lives and heritage buildings.

- Seek advice from an expert with heritage experience before installing a system.

- Any system should be designed and installed to BS 5839-1: Fire detection and fire alarm systems for buildings.

- It is important that automatic fire detection and alarm systems are adequately and appropriately maintained.

Important Note – For any interventions to your building you will require Listed Building Consent (if a listed building). Also, you should consider any advice given by Historic England, the Amenity Societies and other conservation bodies.

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