RISCAuthority

administered by

FPA Fire Protection Association

RC47: Recommendations for the management of fire detection and alarm systems in the workplace

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Contents

Summary of key points

This document has been developed through the RISCAuthority and published by the Fire Protection Association (FPA). RISCAuthority membership comprises a group of UK insurers that actively support a number of expert working groups developing and promulgating best practice for the protection of people, property, business and the environment from loss due to fire and other risks. The table below summarises the key points of the document.

Comply with fire safety legislation	The provision of an effective means of giving early warning of a fire may result from a need to meet: • the requirements of the Building Regulations • the findings of fire risk assessments conducted to meet the requirements of UK fire safety legislation under the Regulatory Reform (Fire Safety) Order 2005 in England and Wales, and equivalent legislation in Scotland and Northern Ireland • other relevant legislation, such as licensing, Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR), or housing and local acts • although not legislatively driven, requirements or recommendations from the insurance industry
Fire and rescue service alarm response policy	Statistics show that approximately 75% of all fire alarm signals received at alarm receiving centres (ARCs) are caused by false alarms that do not require the attendance of fire and rescue services. Therefore, a reduction in response by the fire and rescue services is now the norm, with some implementing no response in certain circumstances. Users must be aware of the official alarm response policy for their area, and should contact their local fire and rescue authority on an annual basis for confirmation of their automatic fire alarm attendance policy.
Benefits and system applicability of multi-sensor devices	Research undertaken in 2018 highlights that the use of multi sensor detection technology could virtually eliminate false alarms. Although such equipment is widely available, its attributes are not generally well known and until these are, fire and rescue services will be unlikely to alter their response. Multi sensor detectors can now be considered for L1, L2, L3 and L4 categories of design under BS 5839-1. When used for category L4 and L3 installations, detectors sited on escape routes should remain compliant with requirements for optical sensitivity as described in BS EN 54-7.
Primary installation standards	Systems should be designed, installed and commissioned by third party suppliers certificated to Loss Prevention Standard, LPS 1014 and/or BAFE SP 203-1. Installations should conform to BS 5839-1 (5.1.2).
Preventing false alarms from manual call points	BS 5839: 2017 introduced the recommendation that all manual call points should be fitted with a protective cover. While that recommendation is not retrospective, in existing systems in which there is frequent unwanted operation of manual call points, protective covers should be fitted (5.2.5).
Use of staff alarm arrangements in complex buildings	A staff alarm arrangement is sometimes used in large and complex buildings to filter potential false alarms. This provides a period after activation to investigate, prior to the operation of the alarm. Staff alarms should only be considered where a sufficient number of suitably trained staff are available and after consultation with the fire and rescue authority and insurers (5.2.7).

1 Introduction

Automatic fire detection systems are designed to give early warning of a fire condition, and can be installed to meet both life safety and property protection fire safety objectives.

In practice, the response of a detector to a fire condition or the activation of a call point is transformed into a voice message, visual and/or audible signal. The signal provides early warning to building occupants to facilitate evacuation and to initiate a manual firefighting response, including calling the fire and rescue service (FRS) if necessary. If the system is directly connected to an alarm receiving centre (ARC), the fire alarm monitoring organisation is likely to have adopted the procedures outlined in Guidance published by the NFCC (ref. 2). To avoid unnecessary FRS attendance for a false alarm, 'call back' alarm filtering has been introduced. The premises receives a call from the ARC, which waits for a maximum of 30 seconds for an answer (unless a longer period is otherwise justified under a risk assessment). If the call is answered at any time within the 30 seconds, the filtering process commences. If the call is not answered within the 30 seconds, the call back process ends, and the signal is relayed to the FRS. Assuming adequate and effective response, enhanced property protection can be anticipated in the event of a fire.

The need to provide effective means of giving early warning of a fire may result from:

- a need to meet the requirements of the Building Regulations, either by way of prescriptive or deemed to satisfy requirements such as Approved Document B (ref. 3), or as a result of a fire engineered solution
- the findings of fire risk assessments conducted to meet the requirements of UK fire safety legislation under the Regulatory Reform (Fire Safety) Order 2005 (FSO) in England and Wales (ref. 4) and equivalent legislation in Scotland and Northern Ireland (refs. 5 to 7)
- other relevant legislation, such as licensing, Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) (ref. 8), or housing and local acts
- the outcomes of assessments undertaken by the business to address specific fire safety objectives, such as the protection of property and high value assets and business resilience
- requirements or recommendations from the insurance industry

Like most fire engineering disciplines, fire detection and alarm system technology has evolved over recent years, resulting in a need for the codes and standards addressing their design, installation, testing and maintenance to be reviewed regularly in order to keep pace with developments within the industry.

The need to manage and reduce false alarms and unwanted fire signals continues to receive attention.

The volume of unwanted fire signals relayed via remote ARCs to the FRS and the resulting FRS appliance response has inevitably impacted on the operational and financial effectiveness of FRSs.

The problem has now escalated to the extent that statistics show that approximately 75% of all fire alarm signals received at ARCs are caused by false alarms that do not require the attendance of FRSs. Therefore, a reduction in response by the FRSs is now the norm, with some implementing a nil response in certain circumstances.

It is therefore important that users are aware of the official alarm response policy for their area and are encouraged to contact their local fire and rescue authority on an annual basis for confirmation in terms of FRS automatic fire alarm (AFA) attendance policy. This information is available to RISCAuthority members through the Informer database.

BS 5839-1 (ref. 1) addresses the limitation of false alarms in considerable detail in section 3, from both the design and end use perspective.

Work was commissioned by the Association of British Insurers with the Fire Protection Association, and was technically supported by RISCAuthority on providing support for the reduction of false alarms through the use of mult sensor fire detectors. The report *Automatic Fire Alarm and Detection Systems* was published in March 2018 (ref. 16), the study demonstrated that whilst the technology which could virtually eliminate false alarms is now

widely available, its attributes are not generally well known and until they are, FRSs will be unlikely to alter their response. The Digital Media Tool (https://www.youtube.com/watch?v=JrJUjZ5akh0&feature=youtu.be) developed as an element of this work provides a mechanism to educate. It is anticipated that the work on immunity tests will compliment and support the other research in this area and accelerate the introduction of immunity tests into standards.

Multi sensor detectors can now be considered for L1, L2, L3 and L4 categories of design under BS 5839-1. When used for category L4 and L3 installations, detectors sited on escape routes should remain complaint with requirements for optical sensitivity as described in BS EN 54-7.

Annex A carries an extract from BS 5839-1 Table E.3 *Example avoiding false alarms*. This provides a summary of typical causes of false alarms and how individual sensors respond to them and shows some indication of how a typical multi sensor detector can be used to improve false alarm rejection.

The National Fire Chiefs Council (NFCC) has published guidance to minimise the unnecessary burden on FRSs as a result of turning up to unwanted alarms (ref. 2). The issuance of unique reference numbers for individual automatic fire detection installations, certification for the design and installation of systems and ARCs are all addressed in this policy.

The NFCC guidance has generally been adopted in full or part by most FRSs. In the meantime, the initial response to alarm activations has been reduced to one pump for premises other than residential, healthcare and other high life risk occupancies.

Generally, the reliability and dependability of a system will be influenced by:

- the adequacy of the design
- the reliability of the components used
- the quality of the installation
- how effectively the system is inspected, maintained, tested and managed on a day to day basis

Inspection and maintenance of life safety systems is also a requirement of certain UK fire safety legislation such as the FSO in England and Wales (ref. 4) and the equivalent legislation in Scotland and Northern Ireland (refs. 5 to 7).

2 Scope

This document provides guidance to insurance surveyors and system users on the requirements for the effective management of fire detection and alarm systems in the workplace.

Guidance is provided on:

- the accepted standards to which systems should be designed and installed
- the need for suitable system certification; design, installation, commissioning, inspection and maintenance guidelines
- the use of third- party accredited service providers
- the control of false alarm and unwanted fire signals (UwFS) as outlined in BS 5839-1: 2017: *Fire detection and fire alarm systems for buildings. Code of practice for system design, installation, commissioning and maintenance* (ref. 1) and the National Fire Chiefs Council (NFCC) – previously Chief Fire Officers Association, *CFOA Guidance for the reduction of false alarms and unwanted fire signals*, 2010 (ref. 2)

3 Synopsis

These recommendations introduce the National Fire Chiefs Council (NFCC) *CFOA Guidance for the reduction of false alarms and unwanted fire signals*, which explains the user's obligations to conform to this document and highlights the inconsistent approach to application of the agreement by FRSs.

Emphasis is given to the need to minimise unwanted fire alarm signals caused by premises false alarms, and how this may be carried out in practice.

4 Definitions

Alarm receiving centre (ARC)

A continuously manned remote centre to which information concerning the status of one or more alarm systems is reported.

Alarm transmission systems (ATS)

transmit critical alarm data across telecommunications networks from a protected premises to an ARC. Dual path ATS's combine a fixed line alarm transmission path with a radio based alarm transmission path, such as GPRS/4G, as a back up.

Automatic fire alarm

An automatic fire alarm system detects fire by monitoring environmental changes associated with fire: most commonly, smoke, heat and combustion gases. AFA are provided to notify the building occupants and initiate evacuation should there be a fire or other emergency. They may be connected to an ARC via an ATS.

Control and indicating equipment (CIE)

Components of a fire detection and alarm system which control, monitor, display and transmit information relating to the status of the system and its components (detection devices, manual call points, sounders and visual alarm devices). CIE units may also provide power to other system components.

False alarm

A fire signal resulting from causes other than fire (for example, resulting from steam).

Unwanted fire signal (UwFS)

A false alarm caused by a fire like phenomenon (for example, dust from contractor operations) sending a fire signal, through the use of an ATS direct to an ARC for the summoning of FRSs. BS 5839 (ref. 1) includes ATSs as part of the "critical path" for the routing of signals.

5 Recommendations

5.1 Design and installation standards and codes of practice

5.1.1 Systems should be designed, installed and commissioned in accordance with acceptable standards and codes of practice by third party suppliers certificated to Loss Prevention Standard, LPS 1014, *Requirements for Certificated Fire Detection and Alarm System Firms* (ref. 14) and/or BAFE SP 203-1 *Fire protection industry scheme for the Design, Installation, Commissioning and Maintenance of Fire Detection and Fire Alarm Systems* (ref. 15).

5.1.2 Installations should conform to BS 5839-1. This code addresses general design considerations, the limitation of UwFSs and false alarms generally referred to as environmental alarms, installation requirements, commissioning/hand-over, maintenance and the responsibility of the user.

Other codes and standards relevant to the design and installation of fire alarm and detection systems include BS 5839, Parts 6, 8 and 9 (refs. 9 to 11), BS 6266: 2011: *Code of practice for fire protection for electronic equipment installations* (ref. 12) and the BS EN 54: *Fire detection and fire alarm systems* suite of documents (ref. 13).

Other supporting codes and standards include those addressing standard and enhanced fire resisting cable, installations in hazardous atmospheres, remote centres receiving signals from security systems and relevant Health Technical Memorandums.

5.2 Unwanted fire signals and false alarms

High levels of false or unwanted alarms have, for some time, been unacceptable to the government, emergency services, insurers and standards generating bodies, such as the British Standards Institution. Some typical causes of false and unwanted alarms are set out in Table 1. The issue is addressed in detail in both BS 5839-1: 2017 – Section 3 and Annex E and the NFCC *CFOA Guidance*, 2010 (refs. 1 and 2).

BS 5839-1: 2017 addresses the categories of false alarms, acceptable rates, causes and measures to limit their occurrence.

5.2.1 Measures to prevent unwanted/false alarms that should be addressed at the system design stage include:

- selection of the type of detection system most appropriate for the location (e.g. point type detection, linear heat or aspirating)
- the selection and siting of fire detectors and use of multi sensor detectors with combinations of smoke, heat and carbon monoxide (CO) sensors (ref 17), and call points fitted with protective covers (now recommended under BS 5839: 2017)
- protection against electromagnetic interference
- system performance monitoring
- filtering measures

5.2.2 Measures to prevent unwanted/false alarms after a system has been installed, commissioned and handed over should be managed/implemented by a competent person and include:

- service, inspection and maintenance – the period between successive inspection and servicing visits should not exceed six months; if not implemented, the system is no longer compliant with the standard
- effective fire safety management
- where practicable and appropriate, given the system architecture and components, replacing existing detectors with multi sensor detectors, should the original components be susceptible to false and unwanted alarms – some reprogramming of the control and indicating equipment may be required to facilitate the use of multi-sensor detectors

5.2.3 The code accepts that false/unwanted alarm rates will be influenced by several factors, but also recognises that the anticipated unwanted alarm rate is likely to be proportional to the number of automatic detectors incorporated in the system. As a result, this code of practice recommends the following:

- for systems incorporating more than 40 detectors in any rolling year, the average false alarm rate should not exceed one false alarm per 20 detectors, or not more than two false alarms from any single detector or call point
- for systems with 40 detectors or less, no more than two false alarms should occur in any rolling year

Where these rates are exceeded, an in depth investigation into the cause should be initiated and suitable mitigating action taken. Under BS 5839 the fire system could be deemed as non compliant, the effects of which could be to render the fire risk assessment of the premises not 'suitable and sufficient' and raising the potential of enforcement action.

5.2.4 Nevertheless, the code recommends that a preliminary investigation should be conducted as part of the service work, and the user informed accordingly if any of the following occurs:

- the rate of false alarms over the 12 month period exceeded one alarm per 25 detectors
- more than 11 false alarms have occurred since the last service visit
- two or more false alarms have arisen from any single detector or call point (other than good intent)
- any persistent cause of a false alarm is identified
- more than two unwanted fire signals within the previous 12 months

All alarm activations should therefore be accurately recorded for periodic review and analysis.

5.2.5 Malicious false alarms are most likely to involve manual call point activation. Occupancies prone to this may include schools, colleges of further and higher education, universities, public carparks, shopping centres and public entertainment venues, such as cinemas, theatres, public houses and night-clubs. Measures to avoid these include fitting 'type A' call points with protective covers, thus eliminating the alarm being raised by accidental collision with the device and also lessening the likelihood of malicious damage.

BS 5839: 2017 introduced the recommendation that all manual call points should be fitted with a protective cover. While that recommendation is not retrospective, in existing systems in which there is frequent unwanted operation of manual call points, protective covers should be fitted.

5.2.6 Subject to the approval of the enforcing authority, consideration could be given to the following to help reduce potential malicious false alarms involving call points:

- not siting call points within the mall areas of covered shopping centres
- subject to adequate surveillance of the premises by persons or CCTV, siting call points at staffed locations and in areas only accessible to authorised persons, or the use of call points with protective covers, thereby requiring a dual action before the alarm is raised
- the use of an emergency voice communication system linked to a permanently manned location, such as a security control room in lieu of the provision of call points in public car parks
- call points should be located adjacent to all storey exits and exits to open air – that lead to a place of safety – this requirement has been amended from that previously stated, which referenced only open air and failed to recognise risk associated with escape into enclose courtyards, for example

5.2.7 A staff alarm arrangement is sometimes used in large and complex buildings to filter potential false alarms. This provides a period after activation of a detector to investigate, prior to the operation of the alarm. Where the alert signal is not silenced within a limited period – usually a maximum of six minutes – the system will automatically revert to an alarm condition. Signals from manual call points, heat detectors and sprinklers normally produce an alarm condition and are not subject to the staff alarm arrangement; but if required should be subject to special consideration. Where an investigation period is employed, FRS attendance summoned through an ARC should be delayed until the outcome of the investigation is known (except in residential care premises, where it is necessary to summon the FRS as soon as the fire detection and fire alarm system operates).

Staff alarms should only be considered where a sufficient number of suitably trained staff are available, and after consultation with the fire and rescue authority and insurers.

5.2.8 A "time-related system" in effect filters out unwanted alarms, rather than obviating their cause. This only tends to be applicable to those systems provided for property protection and used to disable automatic fire detectors (particularly smoke detectors) automatically at certain times of day (or night), when environmental conditions (such as those arising from an industrial process) are likely to give rise to unwanted alarms.

5.2.9 Where fire alarm signals are routed via the routing equipment (ATS) of an intruder alarm system, the standby power supply (battery) for the signaling/transmission equipment should meet the higher CIE (fire panel) standby requirement, rather than the lower power requirement specified for intruder alarm equipment.

5.2.10 ATS equipment should be compliant with BS EN 54-21, and set up in accordance with the requirements of PD 6669 with suitable monitoring options. Dual path ATS routing equipment provides a robust means of communication through TCP/IP connections (fibre) and cellular link to the ARC. It should be noted that the existing PSTN (public switched telephone lines) 50 volt lines will – on a phased basis from 2020 onwards – be made redundant, with all switched off permanently by 2025.

5.2.11 Building zone plans should be displayed adjacent to all CIE (fire panels and repeaters) unless the CIE incorporates a suitable display such as an illuminated mimic diagram.

5.2.12 Cabling and supporting systems should conform to the requirements of BS 7671 (ref. 17) and as described in RC67 *Recommendations for electrical safety in the event of fire* (ref. 18). This precludes the use of non metallic materials for sole means of cable support. Support should be provided throughout the premises, and not just the escape routes as previously implied.

Potential sources of smoke other than a fire in the building	Other potential causes of false or unwanted alarms
Cooking fumes	Dust
Tobacco smoke/vaping smoke	Insects
Smoke from sources other than a fire in the building, such as smoke entering from outside	Aerosol sprays
Cutting/welding	High humidity/steam
Smoke producing commercial or industrial processes	Ingress of moisture/water
Candles/incense	Cooking (e.g. toasters)
Cosmetic smoke (places of assembly/ entertainment)	Fumes (e.g. vehicle exhausts/candles/ manufacturing activities such as welding)
	Temperature fluctuations
	Accidental damage
	System testing without isolation or warning
	Pressure fluctuations where systems are interfaced with sprinklers
	Faulty system components
	Electromagnetic interference
	Malicious false alarms

Table 1: Examples of causes of false and unwanted alarms

Control function	Yes/No	Recommendation
1. Are staff and visitors aware of AFD protection and the potential causes of false/unwanted alarms, and the precautions to prevent them?		
2. Is company policy regarding the causes and prevention of false/unwanted alarm activations included in tender documents along with hot work permit procedures, and are contractors informed and controlled accordingly?		
3. Are the staff and the ARC (where applicable) suitably notified prior to testing or work on the system?		
4. Are all false alarms identified, actioned, recorded and regularly reviewed?		
5. Are building defects that could result in false/ unwanted alarms identified and resolved without undue delay?		
6. Are appropriate precautions taken where work/ maintenance involves paint, duct or smoke that may activate the system? Appropriate steps that can be taken, depending on the type of detectors used, include: • temporary replacement of detectors with a different type • provision of a screen between the detectors and work being undertaken • the use of temporary brightly coloured covers on detectors in the affected area		
7. Are detectors in the affected area disabled or isolated?		
8. Are appropriate staff trained in the procedure for reinstating the alarm?		

Table 2: User false/unwanted alarm prevention checklist

5.2.13 The NFCC guidance provides a suggested framework for cooperative working between the protected premises, ARC (where applicable) and the FRS.

The aim of the guidance is to reduce the number of false/unwanted alarms and subsequent transmission of unwanted fire signals by:

- ensuring that remotely monitored systems are designed, installed, commissioned and maintained to a high standard
- improving fire safety management on the protected site
- reducing the impact of false alarms on business
- reducing the number of false alarms and subsequent transmission of unwanted fire signals to the FRS
- facilitating a risk based approach to the deployment of FRS resources, and reducing the waste of resources due to false alarms
- reducing complacency in the workplace due to repeated false alarms

5.2.14 The process outlined in the model agreement involves:

- the issuing of unique reference numbers to all systems in non domestic premises
- ensuring that systems are designed, installed, commissioned and maintained by companies certificated by a UKAS accredited company in accordance with an acceptable standard
- using an ARC certificated by a UKAS accredited company in accordance with an acceptable standard
- the availability of a minimum of two keyholders for the premises
- the monitoring of performance levels on a monthly basis and the tailoring of FRS attendance accordingly – this may vary from an immediate response appropriate to the risk (Attendance Level One under the NFCC guidance); to an attendance based on the risk but under non emergency conditions (Attendance Level Two) through to no response until the confirmation of a fire has been received from the premises (Attendance Level Three) – confirmed fires will always attract a full response in relation to the risk

5.2.15 It should be noted that the false alarm rates determining the performance level of the system in accordance with the NFCC guidance are less generous than those indicated in BS 5839-1: 2017 (ref. 1). This is because the NFCC guidance adopts the principle that the frequency of unwanted alarms per detector is expected to fall as the number of detectors in the system increases.

For example, under the NFCC guidance, a system with 400 detectors would attract:

- an Attendance Level One for a performance level of four or less false alarms in a 12 month period
- an Attendance Level Two for a performance level of between five and eight false alarms in a 12 month period
- an Attendance Level Three where the number of false alarms in 12 months exceeds eight

By comparison, under BS 5839-1, the user would instigate an in depth investigation if, over a rolling year, more than 20 false alarms occurred for a system with 400 detectors; or if more than two false alarms were received from any single detector or call point.

5.3 Site control and responsibilities

5.3.1 Key requirements for the effective site control of fire detection and alarm systems include:

- a named responsible person appointed to supervise the system – this would be a ‘competent person’ appointed by the ‘responsible person’ in terms of UK fire legislation and defined in BS 5839-1 as “premises management”, this person has day to day control of the premises and the fire detection and alarm system
- control and indicating equipment checked every 24 hours to confirm no faults indicated
- regular visual inspections to ensure that manual call points remain unobstructed, and that a clear space of 500mm is maintained around all detectors
- records regularly reviewed including false/unwanted alarm rates
- all occupants have received suitable instructions regarding the system, including interpretation of alarm conditions and faults, actions to be taken in accordance with the company’s emergency plan and the measures to avoid false/unwanted alarms
- system logbooks kept up to date and available for inspection – recommend a copy of the design, installation, commissioning and acceptance certificate, including any major agreed variations, be kept in the logbook

- records kept in the system logbook should include the name of the responsible person; details of the maintenance arrangements; details of all signals; causes of false/unwanted alarms; full details of all tests/maintenance; and details of all faults and defects
- copies of the following system certificates should be kept readily available on site:
  - design certificate
  - installation certificate
  - commissioning certificate
  - acceptance certificate
  - wireless system radio signal survey results
  - verification and modification certificates as relevant
  - inspection and servicing certificates
- records, drawings etcetera are updated in the event of any changes to the system
- suitable quantities of spare parts are kept available, including tools and frangible elements for manual call points and spare printer cartridges and paper as deemed necessary for the control and indicating equipment

5.3.2 UK fire legislation requires that the 'responsible person' in terms of the FSO (and similar legislation in other parts of the UK) appoint one or more competent persons to assist in undertaking the required preventive and protective measures.

This implies that competent persons will need to be appointed to conduct the testing, inspection and maintenance of the fire detection and alarm system.

5.3.3 Routine testing can be conducted in house by suitably knowledgeable and experienced persons. Suitable training to improve these skills should be available from the supplier/installer, or short courses available from fire safety training organisations.

However, unless specialist knowledge is available within an organisation, periodic inspection and testing is likely to be carried out by a specialist service provider. Competency can be assured by using an organisation that is third party certificated by a UKAS accredited certification body. The Loss Prevention Certification Board sets out requirements for certificated fire detection and alarm system firms in LPS 1014 (ref. 14) and BAFE operates the SP 203-1: *For the Design, Installation, Commissioning and Maintenance of Fire Detection and Fire Alarm Systems* scheme (ref. 15).

5.3.4 Routine testing and inspection frequencies should be based on the outcome of a fire risk assessment that has taken into consideration the type of system and environment in which it is installed. BS 5839-1: 2017 recommends a maximum period of six months between inspections, but more frequent inspections where determined necessary by the risk assessment.

5.3.5 When a user is changing service providers, the servicing organisation is likely to conduct a special inspection to obtain sufficient information for future servicing, and to determine areas of non compliance such as:

- inadequate provision of call points
- inadequate detector coverage
- sound pressure level deficiencies
- inadequate stand-by power supplies
- cabling and cable supports not meeting the requirements of BS 5839-1: 2017
- non compliance regarding monitoring of circuits
- unsatisfactory standards of electrical earthing
- excessive unwanted fire signals/false alarm ratios
- structural changes that may adversely affect the efficiency of the system
- system logbook and record keeping deficiencies

5.3.6 To facilitate arrangements for the repair of any faults or damage, it is recommended that suitable arrangements for emergency call-out be agreed with the supplier (24 hour coverage with attendance of a technician within eight hours of notification from the end user). The contact details of the service provider should also be prominently displayed on the main control and indicating equipment.

5.3.7 The insurance broker/company for the property and the occupier(s) should be informed in the event of the fire alarm system being inoperative; or with remotely monitored systems, the level of FRS response being reduced or withdrawn.

5.4 System testing, inspection and maintenance

Maintenance function	Frequency	Details
Routine testing by user To be carried out by a competent person, normally a suitably trained employee	Weekly	• Audible alarm test during normal working hours by operation of a different call point by rotation – the purpose is to test that the panel processes the signal, and results in the activation of sounders or voice message (refer to BS 5839 Part 8 Section 5 on testing and service requirements for voice alarm systems) • The test should be conducted at the same time each week, and the duration of sounding the alarm should not be less than five seconds or exceed one minute)
	Monthly	• Additional tests organised monthly, for staff that work outside of normal working hours • If a generator forms part of the stand-by power supply, it should be started by simulating a power failure and run under load for one hour – check and top up fuel, oil and coolant as necessary • Conduct a visual inspection of any vented batteries for condition and electrolyte levels • Check link to ARC| and the interface with other systems as necessary
Inspection and servicing To be carried out by a competent person with specialist knowledge of fire alarm and detection systems, normally a specialist service organisation	Quarterly	• Examine all connections on vented batteries – check and top up electrolyte as necessary

Inspection and servicing
To be carried out by a competent person with specialist knowledge of fire alarm and detection systems, normally a specialist service organisation
	Periodic Tests
	At each service visit (at least twice a year or more frequently as indicated by risk assessment)
		• Logbook checked for outstanding actions
		• A structural/occupancy visual inspection to confirm:
		  • call points unobstructed and conspicuous
		  • any new exits provided with an adjacent call point
		  • no new or relocated partitions within 500mm horizontally of any detector
		  • storage does not reach closer than 300mm to ceilings, unless detectors provided in each aisle
		  • a clear space of 500mm is maintained below detectors
		  • any changes of occupancy that may have affected the suitability of the detectors
		  • extensions requiring the installation of detection and alarm devices
		• False alarm records for the last 12 months reviewed, and suitable action taken if required
		• Batteries disconnected and full alarm load simulated
		• The standby battery should be disconnected, the alarms activated, and the power supply output voltage checked to see if it is close to the nominal voltage – it would be reasonable to expect the power supply voltage to achieve at least 95% of nominal voltage
		• Batteries and their connectors to be momentarily load tested (other than those in radio linked system components) to help ensure that they will not fail before the next test – ensure specific gravity of vented batteries is correct

Maintenance function	Frequency	Details
		• Control and indicating equipment alarm functions to be checked by operation of at least one detector, or call point on each circuit and full details recorded • Operation of fire alarm devices checked • Control and indicating equipment controls and visual indicators checked for correct operation • Automatic transmission of fire alarm signals to ARCs tested • All ancillary functions of the control and indicating equipment tested • All fault indicators and their circuits tested • Printers tested to ensure reports are legible • Radio systems serviced in accordance with manufacturers' recommendations • All further checks conducted as recommended by the manufacturer • On completion of work, defects to be reported to the responsible person, documented in the system logbook and a service certificate issued.
Inspection and servicing To be carried out by a competent person with specialist knowledge of fire alarm and detection systems, normally a specialist service organisation	Annual tests Over a 12 month period (may be carried out over two or more service visits within the 12 month period)	• Test the switch mechanism of every call point by removing the frangible element, using a test key or operating the unit as would be operated in a fire • Check all detectors for signs of damage, painting or similar and functionally test each detector (multi sensor detection system, test all elements that are part of the cause and effect) using a product and method approved by the manufacturer of the equipment • Where relevant, check the analogue value is within the range specified by the manufacturer • Check all fire alarm devices for correct operation • Replace all unmonitored, permanently illuminated filament lamps at the control and indicating equipment • For radio linked systems, check radio signal for adequacy • Undertake a visual inspection of accessible cable fixings to ensure they are secure and undamaged • Ensure power supply capacity checked and confirmed as adequate

Table 3: System testing, inspection and maintenance routines

Due to the automatic monitoring of some system functions, some of the above recommendations may be modified or even omitted if deemed unnecessary by the equipment supplier, and if it can be demonstrated that the automatic test achieves the same objective.

6 Checklist

6.1	Control function	Yes	No	N/A	Action required	Due date	Sign on completion
6.1.1	Has a named person been appointed to supervise the system?						
6.1.2	Does this named person meet the requirements for a 'competent person' under the FSO and for implementing the preventive/protective measures related to routine testing?						
6.1.3	Is a system logbook available, complete and up to date?						
6.1.4	Is the control and indicating equipment checked every 24 hours?						
6.1.5	Are weekly audible alarm test(s) of the alarm system carried out by the competent person?						
6.1.6	Is a regular visual inspection conducted to ensure call points are unobstructed, and a clear space of 500mm maintained around detector heads – with the results being suitably recorded?						
6.1.7	Are suitable quantities of consumables for the installation available on site (printer rolls, spare frangible units for call points etcetera)?						
6.1.8	Has a service provider with suitable third party accreditation from a UKAS accredited certification body been appointed for routine maintenance and inspection?						
6.1.9	Does the service contract include provision for 24 hour coverage and attendance within 8 hours of notification by a user?						
6.1.10	Is the frequency for periodic inspection visits based on a suitable risk assessment (minimum of two within a 12 month period)?						
6.1.11	Are the records of unwanted/false alarms reviewed regularly, and suitable action taken where necessary?						

Signature …… Name …… Date ……

7 References

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8 Annex A

False alarm phenomenon	Example false alarm cause	Ionization detection	Optical (scatter) detection	CO detection	Heat detection	Flame detection	Typical multi sensor detection e.g. optical heat	Typical multi sensor detection e.g. optical heat and CO
Steam	Shower or bathroom	****	**	*****	*****	*****	***	***
Smoke	Smoking/kitchen cooking fumes	*	***	****	*****	*****	***	****
Dust	Warehouse	***	**	*****	*****	*****	***	***
Other particular	Aerosol canister product, artificial smoke	*	*	*****	*****	*****	***	****
Sparks/naked flames	Welding	**	**	***	***	*	****	*****
Substance ingress	Insects	***	***	*****	*****	*****	****	*****
High ambient air flow	Air conditioning, open doors/windows	**	*****	*****	*****	*****	*****	*****
Rapid thermal change	Opening of ovens	**	*****	*****	*	*****	****	****

Key choice to avoid false alarm	*****	****	***	**	*
	very good	good	moderate	poor	very poor

Table E.3: Example avoiding false alarms – Extract from BS 5839-1 (ref. 11)

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