Classification: Official

Publications approval reference: PRN00619_ii

NHS England

Health Technical Memorandum 05-03: Operational provisions Part B: Fire detection and alarm systems including the reduction of false alarm and unwanted fire signals

Preface

About Health Technical Memoranda

Health Technical Memoranda (HTMs) give comprehensive advice and guidance on the design, installation and operation of specialised building and engineering technology used in the delivery of healthcare.

The focus of Health Technical Memorandum guidance remains on healthcare-specific elements of standards, policies and up-todate established best practice. They are applicable to new and existing sites, and are for use at various stages during the whole building lifecycle.

Language usage in technical guidance

In HTMs and HBNs, modal verbs such as "must", "should" and "may" are used to convey notions of obligation, recommendation or permission. The choice of modal verb will reflect the level of obligation needed to be compliant.

The following describes the implications and use of these modal verbs in HTMs/HBNs (readers should note that these meanings may differ from those of industry standards and legal documents):

- "Must" is used when indicating compliance with the law.
- "Should" is used to indicate a recommendation (not mandatory/ obligatory), i.e. among several possibilities or methods, one is recommended as being particularly suitable – without excluding other possibilities or methods.
- "May" is used for permission, i.e. to indicate a course of action permissible within the limits of the HBN or HTM.

Typical usage examples

- "All publicly-funded organisations must ensure that all contracts established to collect and treat waste conform to the Public Contracts Regulations." [obligation]
- "All low voltage (LV) distributions should be configured as TN systems." [recommendation]
- "Alcohol hand gels that do not contain siloxanes may be rinsed out and the packaging recycled or placed into the municipal waste stream." [permission]

"Shall", in the obligatory sense of the word, is never used in current HTMs/HBNs.

Project derogations from the Technical Guidance

Healthcare facilities built for the NHS are expected to support the provision of high-quality healthcare and ensure the NHS Constitution right to a clean, safe and secure environment. It is therefore critical that they

are designed and constructed to the highest and most appropriate technical standards and guidance. This applies when organisations, providers or commissioners invest in healthcare accommodation (irrespective of status, e.g. Foundation and non-Foundation trusts).

Statutory standards plus technical standards and guidance specific to NHS facilities:

- Health Building Notes
- Health Technical Memoranda
- Complete list of NHS estates related guidance

The need to demonstrate a robust process for agreeing any derogation from Technical Guidance is a core component of the business case assurance process.

The starting point for all NHS healthcare projects at Project Initiation Document (PID) and/or Strategic Outline Case (SOC) stage is one of full compliance.

Derogations to standards will potentially jeopardise business case approval and will only be considered in exceptional circumstances. A schedule of derogations will be required for any project requiring external business case approval and may be requested for those that have gone through an internal approvals process.

While it is recognised that derogation is required in some cases, this must be risk-assessed and documented in order that it may be considered within the appraisal and approval process.

Derogations must be properly authorised by the project's senior responsible owner and informed and supported by appropriate technical advice (irrespective of a project's internal or external approval processes).

This guidance is not mandatory (unless specifically stated). However, any departures/ derogations from this HTM – including the measures implemented – should provide a degree of safety not less than that achieved by following the guidance set out in this HTM.

Executive summary

This document is one of a suite of documents setting out the fire safety requirements within the NHS. The complete suite is set out in HTM 05-01: Managing healthcare fire safety, HTM 05-02: fire safety in the design of healthcare premises and HTM 05-03: fire safety in the NHS, operational provisions, and is commonly referred to as Firecode.

This HTM focuses on fire detection and alarm systems and provides:

- guidance on the design, installation, commissioning and testing of new fire detection and alarm systems in healthcare premises
- guidance on the design, installation, commissioning and testing of modified existing fire detection and alarm systems in healthcare premises
- guidance on the maintenance of new and existing fire detection and alarm systems in healthcare premises
- guidance on managing and reducing false alarms and unwanted fire signals in healthcare premises.

This HTM is intended to supplement BS 5839-1 'Fire detection and fire alarm systems for buildings' by providing recommendations specific to healthcare premises. It is therefore essential that this HTM be read in conjunction with BS 5839-1 and the other Firecode publications.

It is intended for use throughout healthcare premises, including the acute primary care and mental health sectors. The legal requirement to provide a fire detection and alarm system is covered by the Regulatory Reform (Fire Safety) Order 2005 which states in Article 13:

> 13.—(1) Where necessary (whether due to the features of the premises, the activity carried on there, any hazard present or any other relevant circumstances) in order to safeguard the safety of relevant persons, the responsible person must ensure that—
>
> (a) the premises are, to the extent that it is appropriate, equipped with appropriate fire-fighting equipment and with fire detectors and alarms;

There may be circumstances, for instance small primary care premises, in which there is uncertainty regarding the need for a fire detection and fire alarm system, or the category of system to be used. Guidance is provided in BS5839-1 4.2 and also in HM Government's 'Fire safety risk assessment, healthcare premises' section 3.4.1.

This update incorporates updated guidance previously contained within Health Technical Memorandum (HTM) 05-03 Part H (second edition), which has now been archived. It sets out recommendations and guidance for the reduction of false alarms and unwanted fire signals (UwFS) generated by fire detection and alarm systems within healthcare premises.

As part of the fire safety management of healthcare premises, the number of false alarms and UwFS should be minimised as far as reasonably practicable. The aim should always be to eliminate them. Instances of false alarms and UwFS impact upon the treatment and care of patients and can result in the loss

of appointments, cause significant disruption to care and treatment regimes which can adversely affect staff morale and confidence in the reliability of the fire alarm system. They put additional pressure on resources in busy healthcare environments. UwFS can impact on how the local fire and rescue service responds to fire alarms on healthcare sites.

This HTM covers a wide range of alarm and detection technologies, from conventional systems to multi-sensor detectors in addressable systems. It also includes guidance on design philosophy and technical recommendations. Fire alarm detection and monitoring technology is developing and changing year by year. It is expected that the person using this HTM will have a good understanding of the current technology that is available and how best to apply it around the guidance provided in this document.

Other forms of fire detection equipment not specifically covered by this HTM may be acceptable. The responsibility rests with the system designer to ensure that any form of fire detection and alarm system selected follows the principle of early detection and warning, while minimising the risk of false alarms, always ensuring that the safety of building occupants is paramount.

The importance of fire alarm maintenance has been emphasised by the consolidation of existing fire alarm responsibilities into the new role of Authorised Person (Fire Safety Maintenance).

This HTM replaces HTM 05-03 Part B (2006 first edition) and HTM 05-03 Part H (2009 second edition).

Major changes in HTM 05-03 Part B since the previous edition

- This edition includes the management of false alarms and unwanted fire signals, which was previously in HTM 05-03 Part H. The existing HTM 05-03 Part H on reducing false alarms in hospital premises is to be withdrawn.
- Advice on management of false alarms aligns with the guidance from the National Fire Chiefs Council. This removes arbitrary targets and requires reduction to as low as reasonably practicable.
- This edition permits a “seek and search” strategy on actuation of the fire alarm for patient access areas in order to reduce UwFS.
- It introduces a “maintenance” section which demands a risk-based testing regime to include cause-and-effect and risk assessment of testing procedures which may include additional checks on call-points and automatic detectors acknowledging advances in fire alarm technology.
- The provision of fire alarms in mental health facilities is specifically addressed.
- This edition defines the new role of Authorised Person (Fire Safety Maintenance). This role is currently carried out, but is now formalised in this HTM.
- It requires assurance on “cause-and-effect” at the design, commissioning, testing and maintenance stages.
- It permits greater flexibility on cause-and-effect such as specific doors only closing (electromagnetic door release) on activation of specific detectors rather than any detector/call point in the detection zone.
- A section on project governance sets out the requirement to record any variations from BS 5839-1 and the HTM.

Acknowledgements

Anthony Pitcher Senior Fire Safety Advisor, NHS Wales Shared Services Partnership - Specialist Estates Services

Bill Connelly Fire Safety Officer, Health Facilities Scotland

Chris Callow Risk Based Inspection Programme Lead, National Fire Chiefs Council

David McCabrey Principal Engineer, Health Estates Northern Ireland

David Russell Main technical author, PartB Group

Kenny Pitkethly Fire Safety Officer, Health Facilities, Scotland

Kevin Finch Home Office Fire Safety Unit

Mairead McCartan Fire Safety Manager, Belfast Health and Social Care Trust

Mazin Daoud Head of Fire Safety, NHS England

Michael Rope Head of Technical Guidance, NHS England

Mike Ralph Principal Engineer, NHS England

Pete Wise Technical Director, PartB Group

Peter Aldridge Secretary, National Association of Healthcare Fire Officers (Leeds Teaching Hospitals NHS Trust)

Peter Wilkinson Technical Director Chartered, Engineer, IFE

Richard Clark Fire Engineering/Building Safety, National Fire Chiefs Council

Rosemary Jenssen Jenssen Architecture

Contents

1 Introduction

Note on the Building Safety Act

Following the tragic fire at Grenfell Tower in London in 2017, the government initiated an independent review of building regulations and fire safety which was chaired by Dame Judith Hackitt and is often referred to as the "Hackitt review". This looked primarily at safety in high-rise residential buildings. A number of recommendations were made which resulted in primary legislation in the Building Safety Act 2022 (the Act) and a large amount of secondary legislation including the Higher-Risk Buildings (Descriptions and Supplementary Provisions) Regulations 2023. The Act created "the building safety regulator", which sits within the Health and Safety Executive, which was established to raise safety standards in all buildings and also to take over regulation of higher-risk buildings. These include any buildings at or above 18 m or seven storeys that have two or more residential units. Hospitals that meet the same height criteria are also considered to be higher-risk buildings for some parts of the Act. In the Regulations referred to above, "a hospital" is specified (under section 120D of the Building Act 1984). What this means is that a hospital building that meets the height criteria is subject to the building safety regulator when completing building works and must apply to the building safety regulator for building control approval under Part 3 of the Act where such approval is required. Hospitals are not, however, subject to the management requirements set out in Part 4 of the Act as, being a workplace, hospitals are already subject to the requirements of the Regulatory Reform (Fire Safety) Order 2005 to carry out, review and record fire risk assessments. Despite this, cognisance should be taken of the recommendations in the Hackitt review and the requirements in the Act, along with the recent changes to the Fire Safety Order, some of which have come about as a result of the Hackitt review and have been introduced by the Act.

Scope and purpose

1.1 This document provides guidance on the following subjects:

- The design, installation, commissioning and testing of new fire detection and alarm systems in healthcare premises that are in addition to, or different from, those covered by BS 5839-1.
- The design, installation, commissioning and testing of modifications to existing fire detection and alarm systems in healthcare premises that are in addition to, or different from, those covered by BS 5839-1.
- The maintenance of new and existing fire detection and alarm systems in healthcare premises, that are in addition to or different from the recommendations in BS 5839-1.
- The increasing need to manage and minimise disruptive false alarms and unwanted fire signals in healthcare premises.

1.2 This guidance applies to both new build and existing modified or refurbished healthcare premises. It also covers modifications to existing fire alarm systems required by alterations or extensions to existing healthcare buildings.

1.3 To keep pace with ever-changing clinical demands it is expected that designers will consider the need to build in resilience, flexibility and adaptability wherever it is practical to do so.

1.4 The guidance is intended for those responsible for specifying, designing, installing, altering, testing, commissioning, approving or maintaining fire alarm systems in healthcare premises.

1.5 It is essential that those using this document will be competent to do so. A person will be considered competent where they have sufficient recorded evidence of technical training in conjunction with actual experience and adequate technical knowledge. This is required both to understand the dangers involved fully and to undertake the statutory and Firecode provisions referred to in this HTM. It is essential that anyone using this HTM will possess a broad understanding and knowledge of the fire alarm technologies discussed.

Occupant profiling

1.6 It is understood that the dependency and behaviour of building occupants can greatly influence the efficacy of fire safety precautions. As every occupant must be provided for appropriately, the measures installed must recognise and address the local needs of those at greatest risk.

1.7 HTM 05-02 – 'Fire safety in the design of healthcare premises' categorises occupants on a broad consideration of their anticipated dependency or behaviour. This approach delivers three distinct occupant categories:

a. **Independent**: patients will be defined as being independent if their mobility is not impaired in any way and they are able to physically leave the premises without staff assistance, or if they experience some mobility impairment and rely on another person to offer minimal assistance. This would include being sufficiently able to negotiate stairs unaided or with minimal assistance, as well as being able to comprehend the emergency wayfinding signage around the facility. Where treatment would render any independent patient unable to immediately evacuate the premises unaided, the assembly group classification in Approved Document B would not be appropriate to the premises. In these circumstances, the higher requirements of Firecode guidance should be applied.

b. **Dependent**: all patients except those classified as "independent" or "very high" dependency.

c. **Very high dependency:** those whose clinical treatment and/or condition creates a high dependency on staff. This will include those in critical care areas and operating theatres, and those where evacuation would prove potentially life-threatening.

1.8 For consistency, patient profiles for dependent and very high dependency are used in this document and throughout the Firecode suite of guidance. Where appropriate, specific supplementary guidance has been provided, highlighting particular issues for dependent occupants that key stakeholders should consider.

1.9 Where the premises will be used solely as office accommodation or contain no patient access or clinical spaces (including as part of the means of escape), or used solely for independent patients and have single stage evacuation, the fire detection and alarm systems should follow the recommendations within the relevant parts of BS 5839-1.

Relationship to BS 5839-1

1.10 The British Standard for the planning, design, installation, commissioning and maintenance of fire detection and fire alarm

systems in and around non-domestic buildings is BS 5839-1. It covers new systems and extensions and alterations to existing systems.

1.11 BS 5839-1 is a code of practice containing general recommendations covering a wide range of building types and a wide range of fire alarm systems. Although applicable to healthcare facilities, BS 5839-1 does not provide recommendations specifically related to the particular needs of the healthcare environment. For example, BS 5839-1 makes no reference to areas such as operating theatres. In some instances, BS 5839-1 refers to HTM 05-03 Part B for further guidance.

1.12 BS 5839-1 does not recommend whether or not a fire alarm system should be installed in any given premises. It also points out that, because of the many different systems it covers, simply referring to BS 5839-1 without further qualification will have little meaning.

1.13 BS 5839-1 also does not cover fixed fire extinguisher systems that are often found in healthcare premises.

1.14 BS 5839-1 does not cover voice alarm systems that can be found in or could be recommended for certain healthcare premises. Reference instead should be made to BS 5839-8.

1.15 BS 5839-1 includes guidance on fire alarm systems that can provide signals to initiate the operation of other fire protection systems and equipment or safety measures, as will be required in a healthcare environment as part of cause-and-effect, but does not cover these other systems or the system interfaces themselves. Reference should be made to the BS 7273 series covering the operation of fire protection measures for the interface with ancillary systems and equipment and BS 8519.

1.16 Reference should be made to the following guidance where a gaseous extinguishant system is used:

- BS 7273-1 ‘Electrical actuation of gaseous total flooding extinguishing systems’
- BS 6266 ‘Fire protection for electronic equipment installations’.

1.17 Further guidance on staffed and unstaffed alarm receiving centres, to which fire alarm signals from healthcare premises are often relayed, is provided within BS 9518.

1.18 In addition to the information contained within this HTM, BS 5839-1 also provides useful information on steps to limit false alarms and unwanted fire signals (UwFS).

1.19 This HTM has been prepared to satisfy the need for more specific guidance in healthcare environments. This document is intended to supplement BS 5839-1 by:

- applying the recommendations of the British Standard to healthcare premises occupied by dependent and very high dependency patients
- amplifying and interpreting specific clauses of the standard in the light of the above
- providing additional recommendations over and above those in BS 5839-1, which may in some instances apply and modify that standard
- providing additional guidance on project governance, design procedures and handover documentation required on healthcare projects
- providing additional guidance on the maintenance of fire alarm systems in healthcare premises and the need to strive to reduce and eliminate as far as practicable false alarms and UwFS.

1.20 In view of this, it is important to note that this HTM should be read in conjunction with BS 5839-1 and that the guidance in this HTM does not represent any lowering of standards in relation to fire alarm systems. Where this document amends any requirement of BS

5839-1, for example reducing audibility levels in patient areas, this should be recorded on the relevant certificates (design and commissioning) and within the site-specific operation and maintenance documentation, along with a clear explanation for the reason the variation is required, making specific reference to HTM 05-03 Part B. As part of project governance, any divergence from the applicable guidance or project brief should be reviewed, accepted and recorded by the key project stakeholders during the design and planning phases of any fire alarm project.

1.21 The function of fire alarms in premises accommodating dependent or very high dependency patients is primarily to give warning to staff in the event of a fire so that the site-specific fire response procedures can be implemented. In contrast with most other types of building, these premises contain wards, operating theatres, treatment rooms, MRI or CT scanning facilities and other general patient areas where it may not be necessary or even desirable to give warning to all occupants. The extent to which control over the public alert signals is necessary will depend largely on the overall fire safety strategy, tailored specifically to the occupant profile and the specific needs or function of the clinical department.

1.22 Contracts for fire detection and alarm systems for premises with dependent and very high dependency patients will require compliance with BS 5839-1 and this document. However, both BS 5839-1 and this document contain only recommendations, neither are prescriptive specifications. It is therefore recommended that contracts should also include an appropriate risk-assessed site-specific technical specification as part of the agreed project briefing document to suit the particular site circumstances.

Consultation

1.23 In planning a fire alarm system, it is important to establish at an early stage the design and operational requirements for the system. These must take into account the overall fire safety strategy and its specific evacuation procedures. By way of example, in a mental health setting, where security is an important operational matter, it may be inappropriate to immediately and automatically release magnetically locked final exits.

1.24 The design stage should also carefully consider the future maintainability of the system in clinical settings. This includes managing infection control when designing the system. It should also consider factors such as the use of tamper-proof hardware and reduced-ligature fittings. Additionally, it includes avoiding designs that may lead to false alarms or UwFS. The designer of the system should therefore consult all those stakeholders concerned and document the decisions made that affect the design, operation and future maintenance access for the system and department, including but not limited to the following examples:

- managers
- Fire Safety Managers
- Authorising Engineer (Fire)
- Authorised Person (Fire Safety Maintenance)
- Authorised Person (Fire)
- duty holder (Fire)
- consulting engineer specialising in healthcare fire safety
- estates and facilities management staff
- building control officers/approved inspectors/local authority fire and rescue service fire officers (as appropriate)
- relevant healthcare staff (especially those stakeholders who have a role in responding to alarms)
- those stakeholders responsible for infection prevention and control (IPC)

- insurers (where appropriate and where the system is also providing property protection)
- incumbent maintenance company.

1.25 Where practicable, this should be carried out before awarding the contract for the system and should be included within the project brief and recorded for future reference and review.

Other Firecode documents

1.26 This HTM is referred to in other documents within the Firecode suite, some of which contain recommendations on fire detection and alarm systems. It should therefore be read in conjunction with the latest revisions of other relevant Firecode documents and any other applicable Firecode guidance as and when it is published.

Certification and accreditation of products and services

1.27 Fire detection and alarm systems should be properly designed, installed, tested and maintained. Third-party certification schemes for fire protection products and related services are one way of assessing the level of quality, reliability and safety.

1.28 Healthcare organisations are encouraged to use companies that have been independently assessed by a UKAS-accredited certification body and that are also certificated to the appropriate part of the quality standard BS EN ISO 9001.

1.29 Examples of UKAS-accredited bodies are the British Approvals for Fire Equipment (BAFE) and the Loss Prevention Certification Board's (LPCB) Loss Prevention Standards (LPS).

1.30 BAFE-accredited installers/designers are listed on the BAFE Fire Safety Register and are registered on the BAFE SP203-1 "Design, installation, commissioning and maintenance of fire detection and fire alarm systems scheme" (BAFE Fire Safety Register, 2023).

1.31 LPS-accredited installers are registered on the LPCB's (2023) 'Requirements for certificated fire detection and alarm systems firms (LPS 1014)'. It is recommended that preference be given to fire alarm system products/manufacturers that are listed on the BRE's LPCB Red Book Live website. This is a key reference for specifiers, regulators, designers and end users of fire and security products and services. Selecting LPCB-certificated products and services demonstrates due diligence, quality and reliability.

Note on the use of Building Information Modelling (BIM)

All new major projects are required to use building information modelling (BIM) in order to ensure a coordinated design and provide information for the subsequent operation and possible future development of the facility.

Using a combination of the computation model, asset data and real-world systems, a digital twin (i.e. a virtual clone of an existing system that helps users to understand and improve it) can be developed. This can help monitor and control the building fire systems, testing simulated and real scenarios, giving real-time scenarios for fire situations. This links to the "golden thread of data".

It is important that all information on the design and installation of fire alarm systems needs to be provided to the client so that they can understand the role that the system plays within the fire strategy of the building. This also needs to be provided to satisfy the requirements of Article 38 of the Building Regulations.

2 Definitions

2.1 Terms used throughout the Firecode series and this HTM have the same meaning.

2.2 The following additional terms are defined for the purposes of this Health Technical Memorandum.

Access control system: security technology that manages entry to areas using authentication and authorisation. It can also auto-release doors during fire alarm activation.

Addressable fire alarm system: system in which signals from detectors, manual call points or any other devices are individually identified at the control and indicating equipment.

Alarm Receiving Centre (ARC): continuously staffed premises, remote from those in which the fire detection and fire alarm system is fitted, where the information concerning the state of the fire alarm system is displayed and/or recorded so that the fire and rescue service can be summoned.

Alarm zone: geographical subdivision of the protected premises, in which the fire alarm warning signal can be given separately, and independently of a fire alarm warning in any other alarm zone.

Ancillary service: a device, facility or system which is required to operate when a fire alarm signal occurs.

Authorising Engineer (Fire): See definition in HTM 05-01.

Authorising Engineer (LV): See definitions in chapter 2 of HTM 06-02 – 'Electrical safety guidance for low voltage systems'.

Authorised Person (LV): See definitions in chapter 2 of HTM 06-02 – 'Electrical safety guidance for low voltage systems'.

Authorised Person (Fire)/Fire Safety Adviser: See definition in HTM 05-01. This person may be required to fulfil several roles and responsibilities. In a smaller establishment the same person may fulfil all of these; however, as the size of the establishment increases, it may be appropriate to have separate people fulfilling these, which will include:

a. (fire projects) giving fire safety advice on meeting the statutory requirements of building regulations

b. (fire risk assessment) completing fire safety risk assessments, a statutory requirement of the Regulatory Reform (Fire Safety) Order 2005 (FSO)

c. (fire training) overseeing and delivering fire safety training, a statutory requirement of the FSO

d. (fire safety maintenance) likely to be a member of the estates team overseeing and delivering appropriate maintenance of the premises and the facilities, equipment and devices provided in respect of the premises under the FSO. See paragraphs 7.2–7.4.

Automatic door release: a device for retaining a fire door in the open position and releasing it so that it closes when a fire alarm occurs.

Automatic fire detection and fire alarm system: a system (other than a single self-contained smoke or fire alarm) in which an alarm of fire can be initiated automatically.

Commercial alarm receiving centres: a continuously staffed remote centre in which the information concerning the state of alarm systems is displayed and/or recorded and acted upon appropriately.

Circulation space: the communication routes both within a department/management unit and giving access to other parts of the healthcare premises, and to all necessary fire escape exits.

Compartment: a building or part of a building, comprising one or more rooms, spaces, or storeys, constructed to prevent the spread of fire to or from another part of the same building, or an adjoining building.

Commissioning: process by which it is determined that the installed system meets the defined requirements.

Competent Person: Where a person is required to be competent, they must be able to demonstrate that they have the required **combination of training, skills, experience, and knowledge, and the ability to apply them to perform their role.**

Designer: person or organisation taking responsibility for design considerations.

Escape route: a circulation space or dedicated fire exit route, including a stairway and the hospital street. A path to follow for access to a safe area in the event of an emergency.

Evacuate signal: a continuous sounding of the fire alarm which warns people that there may be a fire in their alarm zone. Evacuation may only be required when a fire is confirmed and evacuation is deemed necessary.

Fire: a fire can be regarded as an incident resulting in the uncontrolled emission of heat and/or smoke.

Fire signal: signal intended to indicate the occurrence of a fire.

False alarm: activation of the fire detection and alarm system resulting from a cause other than fire.

Fire hazard room: rooms or other areas which, because of their function and/or contents, present a greater hazard of fire occurring and developing than elsewhere.

Hazard departments: departments/management units which contain high fire loads and/or significant ignition sources.

Healthcare organisation: organisation that provides or intends to provide healthcare services.

Healthcare premises: a building, or part thereof, used for the diagnosis of health conditions, medical treatment and/or medical care.

Hospital street: a special type of compartment that connects final exits, stairway enclosures and department entrances, and serves as a firefighting bridgehead and a safe evacuation route for occupants to parts of the building unaffected by fire.

Installation: work of fixing and interconnecting the components and elements of a system.

Installer: person or organisation having responsibility for all or part of the process of installation.

Maintenance: work of inspection, servicing, and repair necessary in order to maintain the efficient operation of the installed system.

Multi-sensor detectors: a detector monitoring more than one physical and/or chemical phenomenon associated with fire.

NFCC: National Fire Chiefs Council, which represents the senior management of the UK fire and rescue service.

Networked system: fire detection and fire alarm system in which several components of the control and indicating equipment are interconnected and able to exchange information.

Notional noise level: the noise level which is exceeded for 10% of the noisiest period (for example, daytime in wards) (L10 noise level).

Patient access areas: those areas of the healthcare premises to which patients have reasonable access either with or without supervision.

Phased evacuation: evacuation of different parts of the healthcare premises in a controlled sequence of phases, with those parts expected to be at greatest risk being evacuated first.

Pre-alarm warning: an early warning of conditions which might (or might not) represent a fire.

Progressive horizontal evacuation: evacuation of patients away from a fire through fire-resisting construction into an adjacent compartment or sub-compartment on the same level, free from the effects of fire or smoke.

Protected escape route: A route enclosed with specified fire-resisting construction designated for escape to a place of safety in the event of an emergency (see also escape route). Could include protected lobby, protected corridor and/or protected stairway**.**

Protection: the presence of one or more detector(s) able to initiate actions needed for the safety of life or property in the event of a fire.

Radio-linked system: a fire alarm system in which some or all of the interconnections between components are made by radio links.

Search distance: the distance which has to be travelled by a searcher within a zone in order to visually determine the position of a fire. Note that search distance is not relevant when using an addressable system.

Seek and search (also known as investigation period): the process whereby staff respond to a fire alarm signal without the alarm being passed through to the fire and rescue service. In this context, seek and search refers solely to the delay of a call to the fire and rescue service.

Servicing: routine process of work on the system (including cleaning, realignment, adjustment, and replacement) carried out at predetermined intervals.

Staff alarm: a restricted alarm following the operation of an automatic detector given to certain staff to permit investigation prior to evacuation.

Sub-compartments: areas into which the building can be divided to reduce travel distance, and which provide 30 minutes' resistance to fire.

System type: a designation in BS 5839-1 to describe the function of the system. Type L systems are automatic detection systems intended for the protection of life. Type P systems are automatic detection systems intended for the protection of property. See BS 5839-1 for definitions and descriptions of the system categorisation.

Staged fire alarm: arrangement in which two or more stages of alarm can be given within a given area. An example would be where an alarm system is capable of giving a "staff alarm", "alert" or "evacuate" signal. Note that a pre-alarm warning is not considered to be a stage of alarm.

Unwanted fire signal (UwFS): A UwFS is a false alarm from a fire detection and fire alarm system that has been passed through to the fire and rescue service.

Visual alarm device: Device which generates a flashing light to signal the occupants of a building that a fire condition exists.

Zone: a geographical sub-division of the protected premises in which a function may be carried out separately from any other sub-division. The function may, for instance, be:

- the indication of the occurrence of a fire (detection zone)
- the giving of an audible/visual alarm (alarm zone).

3 System technology

3.1 Addressable fire alarm systems, in which signals from each automatic detection device and each manual call point are individually identified at the control panel, are of particular benefit and are preferred over conventional systems. Rapid identification of the source of an alarm can aid evacuation, first-aid firefighting and fire and rescue service response. In the event of a false alarm or an unwanted fire signal (UwFS), it can reduce the period of disruption. However, this is of less benefit in small healthcare premises, particularly if there are few rooms and mainly open-plan wards. It may also be less appropriate for isolated buildings on a healthcare site (for example, energy centres or remote boiler houses). Addressable systems should be utilised in most healthcare premises unless there is justification not to, supported by a fire-engineered solution and/or risk assessment. Graphical interfaces are also beneficial on larger systems.

3.2 In large healthcare buildings in particular, fire alarm systems using analogue detectors are preferred because of their potential to reduce false alarms. This is particularly the case if the systems' signal processing can discriminate between certain unwanted signals and real fires. Many analogue detectors are also capable of giving a pre-alarm warning that can be beneficial in reducing false alarms. Analogue/multi-state devices should be utilised in most healthcare premises unless there is justification not to, supported by a fire-engineered solution and/or risk assessment. In systems incorporating a very high number of detectors, the use of multi-sensor detectors may enable further reductions in the rate of false alarms.

3.3 Where additions to an existing system are necessary, or a fire alarm system is installed in an extension or as part of a building alteration (for example, a new adjoining building or a commercial enterprise within a hospital), compatible system technology should be employed. This may require equipment of the same manufacturer to be used unless addressable systems of different manufacturers can be fully interfaced. Designers and installers should be fully conversant with the systems they are installing and modifying.

3.4 It is also accepted that this may not always be possible with older systems, as compatible components may no longer be manufactured. If it is not possible to fully interconnect a new analogue or addressable system with an existing system (due to obsolescence issues), the new system should have its own control and indicator panel but be suitably interfaced with the existing system's panel. This will enable replacement of the existing system to be undertaken at a later date.

3.5 The practicality and cost of replacing older, outdated existing systems with

obsolescence issues should be evaluated during the design and planning stages of an extension or alteration project. Replacement of obsolete systems is preferred and should at least be considered in the first instance since there are several longer term benefits. This should be reviewed during the planning and procurement stages of the project. A life-cycle costing exercise is just one example of how replacement could be evaluated.

3.6 The system technology employed should be in accordance with the following guidance:

- For small premises, the system may be of the conventional type if supported by an appropriate site-specific risk assessment.
- For larger premises, the system should be analogue or multi-state addressable.

3.7 To ensure that the fire alarm system functions in a fully integrated manner, compatible system technology should be used throughout the site, with the possible exception of isolated buildings:

- requiring only a small number of detectors/call points, or
- requiring larger numbers of detectors but functioning entirely separately from the healthcare site (for example, a nurses' home) and not dependent on staff in the healthcare premises to respond to alarms (other than summoning the fire and rescue service).

3.8 Where a system comprises a number of separate but interconnected control or data-gathering panels (a networked system), the entire networked system should comply with all recommendations of BS 5839-1. In particular, the cable used for any network connections should comply with the requirements of "enhanced fire-resisting cables" as stated in BS 5839-1.

4 Design philosophy

Project governance

4.1 At the start of the process, the client should provide a robust and detailed project brief identifying the areas and locations to be covered and ensuring that the clinical needs and patient profiles within the affected departments are identified to the designer. The developing design should then be evaluated at key milestone stages against the requirements of the project brief. The number of milestones will depend on the size of the project. Any changes or variations from the brief or from the guidance within this document and BS 5839-1 (or other applicable identified standards) should be agreed by the key project stakeholders and recorded within the design information/project documentation.

4.2 As part of the design process, the guidance in paragraphs 4.3–4.11 should be completed and recorded by the client to demonstrate that the appropriate project governance is being carried out throughout the lifespan of the project. The client should allocate suitably experienced personnel to the key stakeholder roles at the start of the project and ensure early and continuous engagement with the project team at each key milestone stage. Continuity of personnel throughout the project lifespan is beneficial.

4.3 Evidence demonstrating that the designers are experienced and have a comprehensive knowledge of the relevant design standards should be requested and reviewed by the lead engineer or Authorising Engineer (LV) for electrical systems, or Authorising Engineer (Fire) or Authorised Person (LV). This information should be included in the project documentation. By way of example, third-party certification to the BAFE SP203-1 design module could be provided as evidence.

4.4 The fire strategy should be provided as part of the project brief information and must be clear, relevant and up-to-date.

4.5 Through the project brief, the project team should understand the needs of the clinical departments, main users and patient group profiles affected by the project. This understanding will influence the system's design, cause-and-effect strategy and IPC quality standards. This should be conveyed within the project brief or alternatively through recorded design development workshops.

4.6 The proposed fire alarm provision, such as system categorisation, type and coverage, should be included in the project proposals. The project proposals should be reviewed and agreed with project stakeholders in response to the brief. Any variation from the Firecode documents or BS 5839-1 proposed should have a detailed technical analysis to support it and have been reviewed by the client (or its appointed representative). The variation should be agreed with the fire safety team, electrical safety group, clinical leads, IPC team, FM teams and other appropriate project stakeholders. Any comments or variations should be recorded in the project documentation for future reference or review.

4.7 Variations from the normal standards may also require the provision of a detailed and

robust risk assessment as part of the project governance.

4.8 The project design drawings and equipment specifications should be requested from the designer and presented to the appropriate project leads and stakeholders to allow for review and comment at the appropriate stage in the project development. This review meeting should be documented and recorded and the record issued to all attendees and other interested parties. The review should take account of the requirements identified within the brief and any agreed variations or local clinical needs.

4.9 Stakeholders should review the suitability of the proposed plans in the context of coverage, ability to commission and maintain the system, and the required handover documentation. These requirements should be identified and agreed with the design team at an early stage in the project. Proposed installations that cannot be correctly commissioned or adequately maintained will be problematic and could lead to false alarms.

4.10 The designers should include the design documentation for all identified fire alarm system interfaces and should present the proposed cause-and-effect strategy for review and comment by the healthcare organisation's lead engineer or Authorising Engineer (LV) and Authorising Engineer (Fire) and any consulting engineer specialising in healthcare fire safety who has been engaged by the healthcare organisation to act on their behalf in a specialist capacity.

4.11 The cause-and-effect strategy matrix should be agreed with all the interested parties either before or at a very early stage in the design development such that all associated requirements are incorporated into the scope of works and not overlooked.

Protection

4.12 When selecting or modifying a fire detection and alarm system, healthcare organisations should consider the whole life costs including its maintenance and any future upgrades, not just the initial capital outlay. This consideration should be made whether a system is being installed as part of a new build or whether the current protection needs upgrading or replacing as part of refurbishment or extension.

4.13 Fire detection and alarm systems in healthcare premises are primarily intended to protect life, but they also have a role in property protection. Early warning of fire can also be of benefit in minimising disruption to the functioning of the premises and in ensuring prompt resumption of services.

4.14 The extent of protection will depend on the particular local site's circumstances. While in most cases it will be appropriate for all parts of a building to be protected (i.e. L1 as defined in BS 5839-1), in others it may be appropriate to omit detectors from certain low-risk areas if an assessment of fire risk determines that they are not required.

4.15 In assessing fire risk, account should be taken of the business continuity requirements. Also, a fire in a non-patient-access area may seriously affect patient care by:

- spreading to a patient access area
- disrupting a service or function upon which patient care depends (for example, heating, power, medical gas plantrooms and pharmacy)
- causing prolonged vacation of parts of the building due to firefighting operations and subsequent building restoration
- destroying critical records
- damaging or destroying reserve and back-up life-saving equipment in storage (for example, neonatal, theatre or critical care apparatus).

4.16 Detectors may only be omitted from an area that:

- is under continuous surveillance by staff or
- has neither a high fire load nor significant ignition sources and in which all the following conditions are satisfied:
  - the area is not a patient access area
  - the area does not contain any equipment or services on which patients are dependent
  - the area does not contain contents of high value or items critical to continuous patient care, noting that the term high value can refer not just to financial considerations but an items value to the continued provision of care
  - there is adequate fire separation between the area and adjoining patient access areas in accordance with the requirements of the applicable Building Regulations and the applicable Firecode guidance documents
  - the variation has been accepted by the client as acceptable during the project briefing and design development stages.

4.17 An example of an area where detectors may possibly be omitted, supported by risk assessment, is that of telephone switchboards that are continuously staffed.

4.18 The responsibility for determining the appropriate system category for any application needs to be identified as part of the project brief/scope. Consideration should be given to any input the building insurer may have on the system category. Normally a Category L2 or L3 system should be provided for healthcare premises other than hospitals. A Category L1 system should be provided throughout all parts of the hospital premises. However, detectors need not normally be provided in the following areas:

- voids and roof spaces of any depth which contain only the following and only when subject to a robust risk assessment:
  - fire-resistant cabling or wiring clipped to a metal tray with metallic cable clips or ties or within metal conduit or trunking
  - non-combustible pipework and ducts
  - metal or plastic pipes used for water supply or drainage

Note:

Where compartmentation may be compromised, it can allow smoke to travel undetected. This should be considered in the ceiling void risk assessment.

- bath/shower rooms
- toilets in staff areas (toilet cubicles not toilet areas)
- small cupboards (less than 1 m^2) with no ignition sources.

Note:

In operating theatres, detectors should be present unless justification for their omission is provided. There will be a requirement to determine the appropriate response in the event of a fire alarm condition as detailed in the fire alarm cause-and-effect statement. A local departmental fire alarm activation should normally be notified to the theatre staff via the surgeon's panel in the room.
(See HTM 03-01 and HBN 26 for further details of the interfaces between the fire alarm systems and the critical building services systems within operating theatres. Consideration of the cause-and-effect regime associated with operating theatres is required in the event of an alarm activation within the department.)

4.19 Omission of detectors from any areas should be the subject of consultation with stakeholders and a formal risk assessment which should be recorded in writing and included within the project documentation. The following areas should always be fully protected:

- all patient access areas
- fire hazard rooms and areas
- rooms or departments below patient access areas from which fire can spread vertically to affect patient access areas
- hazard departments
- stairways, lobbies, circulation areas and corridors used as means of escape when not in frequent use
- patient hotels
- commercial enterprises
- atria
- mechanical and electrical services plantrooms
- toilets accessible for use by the public.

Operating theatres

4.20 The scenarios in paragraphs 4.21–4.26 are based on a standard theatre configuration, assuming air handling units (AHUs) are located in a plantroom directly above the theatre suite, all of which are compliant with HTM 05-02 and HTM 03-01 Part A. Other configurations may be encountered where the principles of these examples can be applied.

Scenario 1: External fire

4.21 If smoke is drawn in through the air intake and activates the in-duct detector immediately downstream of the AHU, the affected AHU shuts down and the related fire smoke/ dampers close. In addition, the standard cause-and-effect should be implemented. A BMS central alarm and local low airflow lamp on the surgeon's panel is also recommended.

Scenario 2: Fire inside the AHU

4.22 If the AHU ignites and fire/smoke is contained within the airstream, treat as scenario 1.
If fire/smoke is outside of the airstream, the detector within the plantroom should activate; therefore treat as scenario 3.

Scenario 3: Plantroom detector activates

4.23 Activation of any detector in the plantroom triggers fire alarm sounders, fire doors, non-life-critical ventilation and associated fire/smoke dampers, etc. as detailed in the cause-and-effect strategy. All life critical plant continues to run.

Scenario 4: Manual call point in plantroom

4.24 Activation of manual call point in plantroom, treat as scenario 3. Although it is assumed to be a controlled area with restricted access, manual call points should be fitted with protective covers to prevent accidental activation.

Scenario 5: Fire in theatre zone

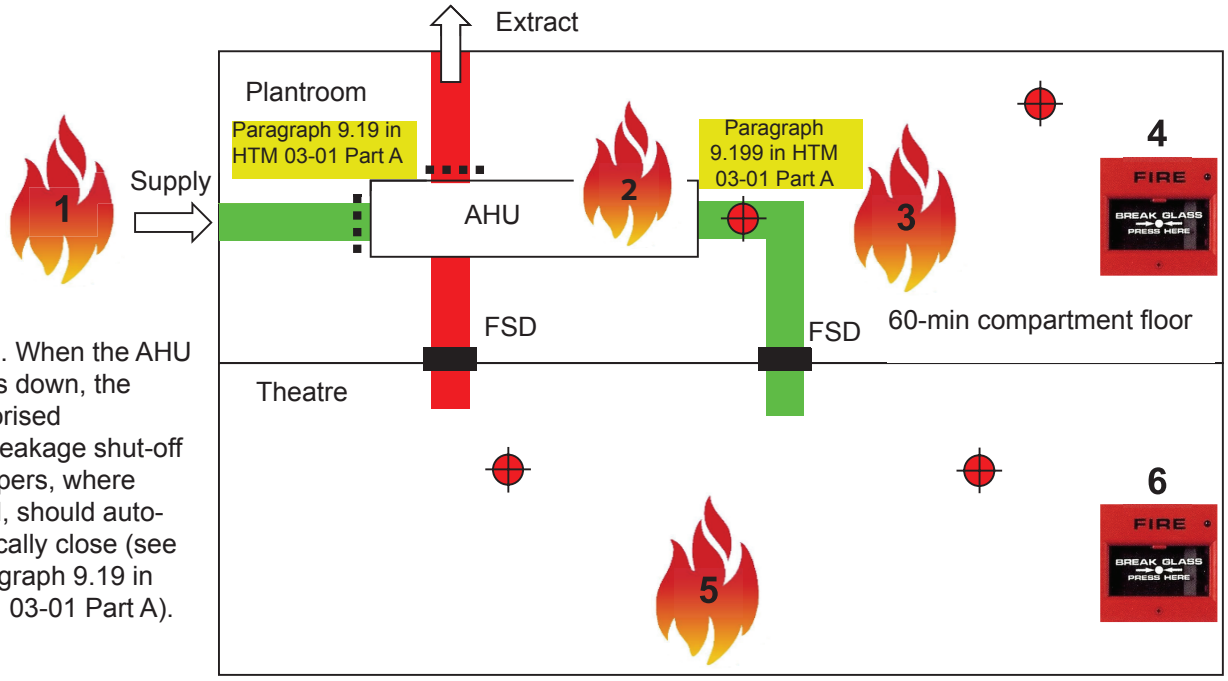
4.25 Activation of any detector head in a theatre zone triggers the related fire alarm sounders, fire doors, non-life-critical ventilation and associated fire/smoke dampers, etc. as detailed in the cause-and-effect strategy. All life critical plant continues to run.

Note:

Provision of override facilities (for use by competent persons) as detailed in paragraph 5.57 of HTM 05-02 will enable shut down of related AHUs and associated dampers. (Reason: ventilation pressurising a theatre suite may prevent smoke entering that suite. Likewise, if fire/smoke is in one of the theatre suites, the continuation of the ventilation arrangements may force the smoke into the adjoining circulation routes, potentially spreading the incident and compromising escape from adjoining suites: circumstances dictate the need to shut off the AHUs.)

Scenario 6: Manual call point in theatre zone

4.26 Treat as scenario 5, noting that manual call points should be fitted with protective covers to prevent accidental activation.



Note. When the AHU shuts down, the motorised low-leakage shut-off dampers, where fitted, should automatically close (see paragraph 9.19 in HTM 03-01 Part A).

Key:

= relates to the numbered scenarios in paragraphs 4.21–4.26

= detectors

AHU = air handling unit
FSD = fire/smoke damper

Zoning

4.27 The building should be divided into zones for the purpose of indicating the presence of fire (detection zones) and giving the alarm signal (alarm zones). Wherever possible, detection zones and alarm zones should correspond with each other. In non-patient access areas, it is permissible for an alarm zone to be made up of more than one detection zone but not vice-versa (see Figure 1). Alarm zones should be bounded by fire resisting construction. At the design stage, client endorsement of the zone boundaries should be sought.

4.28 The above reference to detection zones is provided as guidance for existing premises and existing systems on the basis that most new systems will be addressable.

4.29 To facilitate progressive horizontal evacuation in patient access areas, each sub-compartment should normally be a separate zone (see Figure 1). Hospital streets are often extensively subdivided by sub-compartment boundaries. The alarm zones for a hospital street may therefore include several sub-compartments, but need to correspond, as far as possible, with the boundaries of adjoining alarm zones.

4.30 The search distance criterion set out in BS 5839-1 need not apply where the system is addressable and the source of the alarm can be readily determined from the description of each device's location. New systems should be addressable as opposed to conventional.

4.31 With conventional fire alarm panels there can be multiple automatic detection devices in a zone. In a fire alarm condition, only a general zone alarm would be generated with no specific detector location or type being identified on the control and indicating equipment (CIE). In a fire alarm condition, an addressable system can provide a specific

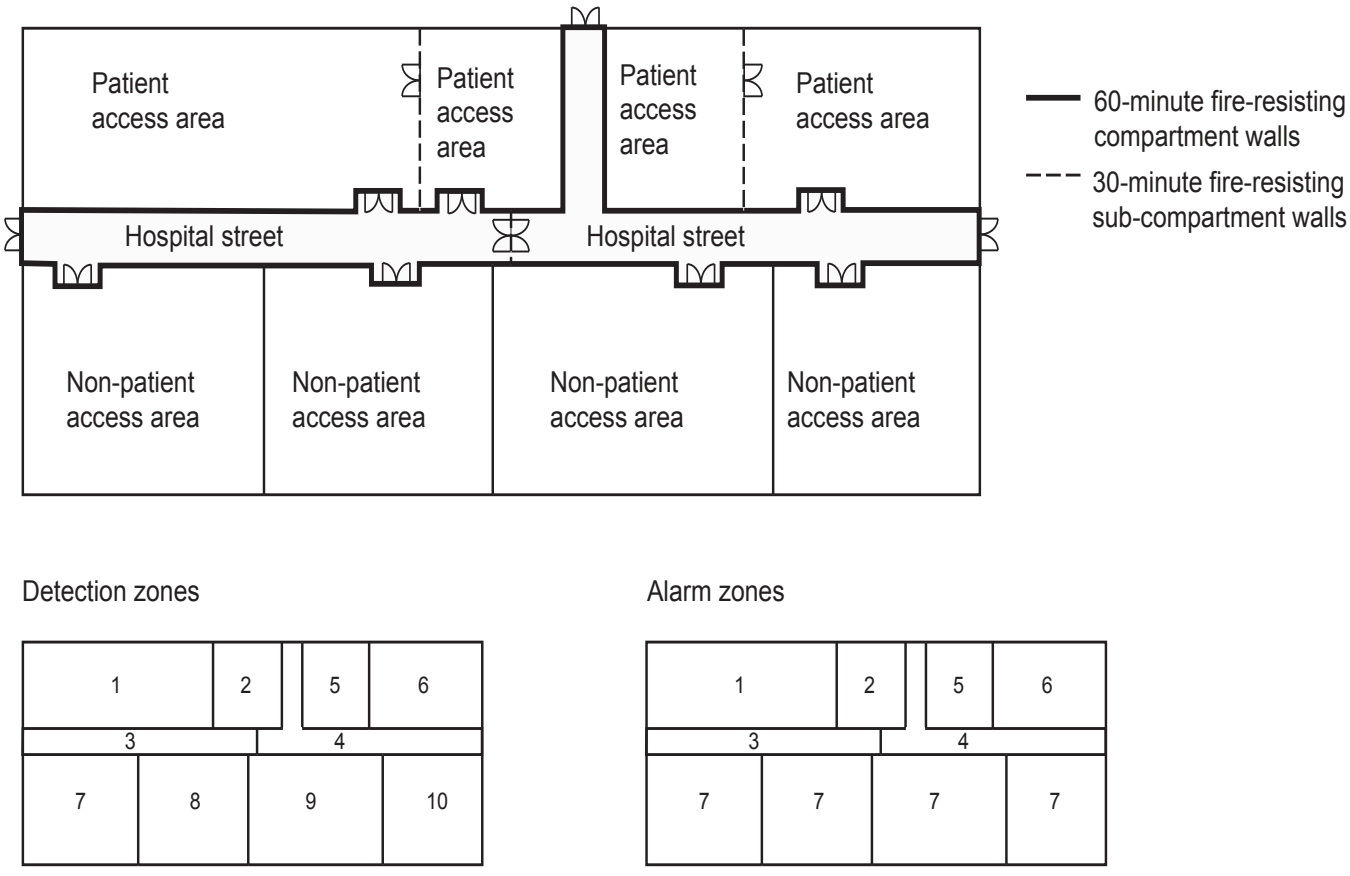


Figure 1 Fire alarm zones

location and type of automatic detector that has been activated.

4.32 Atria, commercial enterprises and hazard departments should be separate detection/ alarm zones.

Alarm

4.33 In many healthcare premises, it is the staff and not the patients who need to be alerted (for example, premises where staff intervention is necessary to assist patients to evacuate). In some key clinical areas, the staff will be best placed to initiate the evacuation (see paragraphs 8.49–8.55 on staff alarms). The fire alarm will need to be able to signal an alarm in the appropriate areas and sequence that is required by the evacuation strategy.

4.34 The audibility of the general alarm in those patient access areas where patients require assistance to evacuate should only be sufficient to warn staff (see additional guidance below). The extent of the alarm should initially be restricted to those areas involved in the first phase of the evacuation of the affected department, floor or area, or as deemed appropriate. Consideration should also be given to the dependency of the patients.

4.35 In patient access areas, a phased alarm system should be operated, such that the sub-compartment/compartment or alarm zone from which the alarm has originated receives the “evacuate” signal and adjacent sub-compartments/compartments receive the “alert” signal (see Figure 2 for a typical phased alarm arrangement). However, to operate a phased alarm, there should be adequate acoustic separation between areas in which the “evacuate” signal will be given and areas in which the “alert” signal will be given. This will normally be provided by the fire compartmentation between zones.

4.36 Consideration should also be given to providing, during the first phase, an “alert” or “evacuate” signal in other parts of the building from where escape may be difficult or protracted (for example, basements and roof plantrooms). Consideration should be given to audio-visual alarm signals for staff in areas such as basements or roof plantrooms. Plantroom areas may require additional local access controls or procedures where escape is more difficult in the event of a fire alarm.

Cause/effect diagram

Alarm in zone / Detection in zone	1	2	3	4	5	6	7	8	9
1	●	○		○					
2	○	●	○		○				
3		○	●			○			
4	○			●	○		○		
5		○		○	●	○		○	
6			○		○	●			○
7				○			●	○	
8					○		○	●	○
9						○		○	●

● Evacuate/continuous ○ Alert/intermittent

Zoning

Second floor	1	2	3
First floor	4	5	6
Ground floor	7	8	9

Note:
This diagram is for illustrative purposes only. It does not represent the full complexity and extent of the actual system but is simply included with the aim of enhancing clarity and facilitating understanding.

Figure 2 Alert and evacuate audibility matrix

4.37 To avoid unnecessary disturbance, staff elsewhere in the building who are required to perform particular tasks in the event of a fire, such as facilities or estates management, should be alerted by means other than the sounding of the fire alarm (for example, by mobile devices such as the local staff mobile phone system or staff pagers).

4.38 In areas where the fire strategy requires patients to escape unaided on hearing the alarm and in non-patient access areas, the audibility of the alarm should be in accordance with BS 5839-1.

4.39 The purpose of the fire alarm system, where progressive horizontal evacuation is adopted, is primarily to alert staff. Non-ambulant occupants are likely to understand an alarm signal, but as a result of their medical state or treatment will be unable to evacuate unassisted, and this may cause confusion and distress. In any case, in areas utilised for patient treatment or care, evacuation should be aligned to the emergency evacuation plan which may require evacuation only being initiated on the direction of the nurse/person in charge of a ward or department. The fire alarm strategy and evacuation plan should take account of the level of dependency and particular needs of the affected patient group.

4.40 The well-being of dependent and very high dependency patients, including, for example, those in mental health facilities and operating theatres, is partly dependent on the consistent maintenance of their local environment. It is paramount that due consideration is given to any precaution or measure installed which may prove detrimental to their present condition, such as sudden loud noises.

4.41 The matrix in Figure 2 represents alert and evacuation audible tones in adjoining zones to that of the fire alarm system activation. In addition to this element of the overall cause-and-effect strategy, the requirement of other sounder outputs and ancillary system fire alarm interfaces should be considered and included, for example:

- The attendance of the firefighting services.
- Interfaces with remote monitoring stations.
- The summoning/alerting of key staff.
- The safe movement of persons (public) not directly affected by the zone in fire.
- The clearing of firefighting access and escape routes.
- Notification to persons working in remote areas that may need to escape later via the area of activation i.e., rooftops, plantrooms and other key areas covered by the local site-specific risk assessment.
- The interface with building services systems, ventilation plants, fuel supply systems and smoke control systems, etc.
- The need to minimise false alarms and, where identified as appropriate, the need for an investigation period.

4.42 Audible alarm devices should usually be provided in all areas of the premises. There should be careful siting of alarm devices so as to warn staff without undue disturbance to patients. To achieve this, the audibility of the general alarm in areas where patients require assistance to evacuate need only be typically in the range 45-55 dB(A), or 5 dB(A) above the notional noise level, whichever is greater. As far as possible, sound pressure levels greater than this should be avoided.

4.43 It is preferable that many quieter sounders, rather than a few very loud sounders, be used in order to minimise local noise levels and avoid unnecessary disturbances.

4.44 Visual alarm devices may be provided as an alternative to alarm sounders in areas

where an audible alarm is unacceptable (for example, some areas in a mental health unit, and very high dependency patient access areas such as operating theatres, critical care areas and special care baby units).

4.45 Visual alarms may, if required by the fire strategy, also be considered in the form of Do Not Enter, Do Not Exit illuminated signs and/or flashing beacons to aid the safe movement of public and staff and prevent them from moving towards the area of activation. Illuminated signs in highly populated and trafficked public areas would help prevent persons moving towards the area of activation and should coincide with the closure of fire doors.

4.46 Consideration should be given to specific audio-visual alarms associated with internal and external plantroom areas, often heavily serviced and difficult to egress quickly, to provide early warning to maintenance staff of a fire alarm activation.

4.47 In some healthcare premises, it may be desirable (or beneficial) to incorporate the use of voice alarm systems. Any voice alarm system should comply with BS 5839-8. However, local voice messaging can be achieved via interfacing directly with the fire detection system via an interface unit. Areas such as lift lobbies “Fire Alarm Activated – Lift Not in Use” and stairway/door entrances “Fire Alarm – Do Not Enter” are suitable locations where local voice messaging may be considered as part of the cause-and-effect strategy.

Mental health services

4.48 The alarm system in a mental health facility should be configured in a manner appropriate to the needs of the service-user profile. The designer will require input from the local clinical staff to understand the specific needs of more vulnerable service-user groups and how this will affect the fire alarm system design. This should be included in the briefing information and considered at an early stage of the design development. In some situations, mental health service-users may not react to a fire alarm signal in a manner anticipated by fire detection and alarm guidance.

4.49 The design of the alarm system should consider the nature of the occupants and mitigate undue distress to service-users who may react atypically to a conventional fire alarm. For example, consideration should be given to the provision of alarm devices capable of producing musical output. Such devices should be of a self-contained, pre-recorded message type, allowing for the broadcast of a coded alarm to alert staff with minimum disturbance to patients.

4.50 The design and construction of fire alarms in a mental health setting should enable progressive horizontal evacuation to an adjacent compartment. The alarm and cause-and-effect matrix should be designed to alert staff without causing undue distress to service-users.

System control and display of information

4.51 Information on the existence and source of an alarm is required for the following purposes:

- to enable any “seek and search” protocols to be followed (see paragraphs 8.56–8.66)
- to enable the fire and rescue service to be summoned in accordance with the fire strategy
- to allow staff to respond in accordance with local evacuation procedures
- to guide the fire and rescue service to the source of the alarm.

4.52 In addition to undertaking normal system control functions, staff or the fire and rescue service may also need to control the phased evacuation of the building. In these situations, the healthcare organisation retains responsibility for the evacuation of the building

based on the operational needs of the fire and rescue service.

4.53 The necessary CIE and its siting to facilitate the above will depend on the evacuation procedures for the healthcare premises and will therefore be determined by local site circumstances. There should at least be a control and indicator panel at a suitably staffed location from where the fire and rescue service can be summoned, and at the designated entrance at which the fire and rescue service attend. In addition, consideration should also be given to the security of control and indicator panels against unauthorised use.

4.54 In large healthcare premises, repeat control and/or local indicator panels may also be required at points where staff rendezvous. It may also be desirable to give information to staff not directly involved with the initial fire alarm signal. This early warning can assist them in making the necessary preparations for the possibility that a wider evacuation may be necessary. This would, for example, be relevant to areas with vulnerable or dependent patient groups in key clinical areas. This should be achieved by, for example, the use of repeat alphanumeric text displays at nurse stations or via staff mobile phone or pager systems for key clinical staff or departmental leads.

4.55 Where a healthcare site consists of many buildings and there is more than one fire alarm system, alarm signals should be relayed to a common 24-hour supervised location from where the fire and rescue service can be summoned and from where staff who perform particular tasks can be alerted. See also Chapter 8 on the need to avoid false alarms and UwFS.

4.56 As a minimum, CIE should be provided at the main entrance to the premises (or at the entrance at which the fire and rescue service attend, if different to the main entrance). CIE should also be provided in a location supervised 24 hours a day (for example, telephone switchboard or a remote monitoring station), where present. Zone plans should be provided adjacent to all CIE locations for assistance.

4.57 Additional CIE, capable of displaying the location of an alarm incident to a similar degree to that of the main panel, should be provided in every management unit and, in any case, such that the travel distance to an indicator panel does not exceed 60 m. Additional CIE equipment should be provided where required by local evacuation procedures. In particular, a repeat indicator panel should be provided at the evacuation control point of any escape bed lift(s). This should be the subject of consultation and included within the healthcare organisation's project brief as part of the project governance.

Cause-and-effect of ancillary services

4.58 In a healthcare building there are systems, devices or facilities related to the means of escape and other fire precautions that may depend on the fire alarm system for their actuation. These should be detailed within the agreed project cause-and-effect strategy and may include the following:

- automatic door releases and door control systems
- access control systems
- ventilation systems and smoke damper control systems
- operating theatre ventilation systems (see HTM 03-01)
- fuel supplies (note: special consideration will be required for fuel supplies serving emergency systems or critical backup systems such as generators)
- lifts and escalators
- fixed extinguishing systems
- smoke control systems

- stairway pressurisation systems
- site signalling systems
- fire shutters or curtains
- emergency lighting systems.

4.59 Arrangements will be required to cater for the above interfaces during routine fire alarm testing. It will not always be desirable to test the interfaces during a fire alarm test due to the disruption caused. The frequency for system interfaces and the cause-and-effect to be tested or reviewed should be determined by the healthcare organisation.

4.60 Cause-and-effects can be simply termed inputs and outputs. A trigger or activation of the fire detection system (cause/input) requires the fire detection system to produce an action (effect/output).

4.61 It is important to establish the operational requirements for the system at an early stage and must consider the overall fire safety strategy and any specific evacuation procedures.

4.62 Consultation with the interested parties should be conducted either before or very early in the design phase such that all associated requirements are incorporated into the scope of works.

4.63 Sufficient time and resource should be given to the testing and subsequent witnessing of the complete cause-and-effects. Sample testing should not be permissible.

4.64 It may not always be necessary to actuate ancillary services when the fire alarm system operates. For example, (a) electronic locks securing exit doors may not need to be released automatically if a manual means of override is present by the door, (b) automatic door releases may only operate on activation of the detector either side of the door to facilitate evacuation and communication (for example, in hospital streets). It is important, therefore, that the need for actuation of ancillary services is established in the light of the local overall fire safety strategy, and through consultation with project stakeholders at an early stage of the project planning. Testing of ancillary services should be included if not part of the fire alarm testing regime.

4.65 The cause-and-effect logic for the actuation of ancillary services should be documented in the form of a matrix or whatever format is specified by the client. This should be part of the specification for the system. Cause-and-effect documentation is likely to be a large, complicated document. The format should be developed and agreed with the client so that it will remain accessible throughout the life of the system.

4.66 The designer or appointed third-party specialist should capture (through workshops) the healthcare organisation's cause-and-effect requirements on the matrix, and on completion should convert the information into a clear and understandable format for ease of reference by the healthcare organisation.

4.67 No changes to cause-and-effects should be made without approval of the healthcare organisation.

4.68 The designer or appointed third-party specialist should be responsible for the updating of the cause-and-effect matrix during the workshop process through to completion.

4.69 The healthcare organisation should consider if and when it is appropriate to carry out a full cause-and-effect system test to prove the ancillary services interfaces. The system interfaces should be tested, proven, and demonstrated as part of the project handover and commissioning phases.

4.70 The designer or appointed third party has the responsibility of defining the outcome requirements of cause-and-effects as these will align with the healthcare organisation's fire safety plan, evacuation plans and operational responses.

4.71 The cause-and-effect logic for the actuation of ancillary services should be based on but not limited to the following.

Automatic door releases systems

4.72 For fire doors to be held open on automatic door releases, all of the following criteria should be satisfied:

- The door release mechanism should conform to both BS 5839-3 and be fail-safe (that is, in the event of a fault or loss of power the mechanism should release automatically).
- All doors fitted with automatic door releases should be linked to the fire detection system.
- All automatic door releases within a compartment/sub-compartment or fire alarm zone should be triggered by all of the following:
  - The actuation of any automatic fire detector or manual call point within the compartment/sub-compartment or zone unless the fire strategy supports specific doors releasing on actuation of smoke detectors either side of the door: in which case, such detectors should be located in accordance with the requirements as defined within BS 7273-4. The door release criteria should be referenced. The designer needs to determine the "Category of Actuation" in the first instance as defined in BS 7273-4.
- Automatic door releases should be provided with a ready means of manual operation from a position at the door (easily accessible when the door is open) and should be located in accordance with BS 7273-4.

4.73 Automatic door releases should be arranged to automatically close doors, both within and forming the boundary of alarm zones where the "evacuate" signal is sounded or in line with the fire strategy. This should be agreed with stakeholders as part of the cause-and-effect development. This may be the subject of a fire-engineered solution and may differ as areas in alert may be able to continue with business as usual until such time as the alert tone becomes the evacuate tone. This mitigates disruption to areas that are quite remote from the origin and further protected by compartment or sub-compartment walls and fire doors.

4.74 Doors to staircases should not be held open by means of door hold-open devices unless specifically supported by the fire strategy.

Access control systems

4.75 Where required, access control systems should automatically release (unlock) doors forming exits from alarm zones where the "evacuate" signal is sounded. The system should generally be designed to "fail safe".

4.76 The alarm and detection system would normally be linked to any security locks that normally prohibit access to defined areas or the exterior. The mode of operation should be configured so that security locks are only activated to areas required for use as part of the progressive evacuation process. For example, inadvertent operation of security locks to the exterior may divert essential resources to manage containment when they are needed to manage fire safety. Security lock release may also be the subject of cause-and-effects via an engineered solution, in that doors may need to be released to allow for attendance of the fire and rescue service.

4.77 Security locks should be configured as part of the alarm and detection system in such a way as to facilitate patient containment where necessary, whilst remaining responsive to the needs of fire safety and the potential external access by the attending fire and rescue service.

Ventilation systems

4.78 Mechanical ventilation and air-conditioning systems serving critical patient care departments such as operating theatres, critical care areas and special ventilated isolation rooms should not normally be stopped when the fire alarm system operates. For these areas, a notice should be affixed to the fire control panel drawing attention for the need to liaise with departmental staff before switching off fan units.

4.79 HTM 03-01 provides specific guidance on healthcare ventilation and HBN 26 for operating theatre departments (soon to be replaced by HBN 10-01). It may be acceptable to shut down non-critical, non-clinical ventilation systems in the event of a fire alarm activation within the departments or areas they serve.

4.80 Where ventilation systems include smoke-controlled dampers in the ductwork distribution network that close as part of the fire alarm cause-and-effect strategy, then consideration should be given to shutting down the associated ventilation fans to prevent system damage, unless they have over-pressure protection built-in. This should form part of the cause-and-effect strategy and should be discussed and agreed with the healthcare organisation as part of design development.

Fuel supplies

4.81 Plantrooms using gas or oil fuel supplies for cooking, heating and hot water production should include an automatic device to cut off the fuel supply to the building in the event of a fire alarm in the zone where the plantroom is affected. The cause-and-effect strategy should reflect the areas where this applies. Kitchens should also follow the advice included in the Building Engineering Services Association's (BESA) (2018) 'Specification DW/172 for kitchen ventilation systems' and BS 6173 for catering. Special consideration should be given to fuel supplies serving emergency power generators or other critical systems in the event of a fire alarm. This should be discussed and agreed with the healthcare organisation as part of the design development.

Lifts

4.82 Where lifts discharge into alarm zones in which the "alert" or "evacuate" signal is given, they should be returned to ground level or the level of the final exit from the building, if different, and disabled. Where the "alert" or "evacuate" signal is given at the ground level or final exit level, the lifts should be held at an alternative level and disabled. Evacuation lifts should not be controlled by the fire alarm system once brought back into service by the operation of the "evacuation control switch". Lift operation should be the subject of an engineered solution derived through cause-and-effects stakeholder consultation.

Smoke control systems

4.83 Smoke control and extract systems in, for example, atria, commercial enterprises, car-parks and basements should only be actuated automatically when fire is detected in the areas they serve.

Integrated systems cause-and-effect test

4.84 Integrated systems are those that combine fire alarm functions with non-fire-related functions such as the grounding of passenger lifts. Integrated 100% cause-and-effect testing should be carried out before contract completion. When a system is modified, interactions with the main system should be 100% tested.

4.85 The following requirements are to be submitted by the appointed designer/specialist to satisfy the cause-and-effect verification process, all of which should be approved by the healthcare organisation or their appointed representatives prior to any cause-and-effect testing:

- cause-and-effect matrix highlighting the areas specific to the scope of works
- full cause-and-effects detailed and approved program of testing
- cause-and-effect test sheets specific to the scope of works
- full and comprehensive plan of action and identified attendances
- cause-and-effect specification (if applicable)
- fire system fully commissioned to BS 5839-1, Section 5
- interfaces to all third-party equipment connected and tested
- power supplies to panels and ancillary equipment all tested and certified
- any specialist resources engaged for attendance.

4.86 Only when the above requirements have been satisfied can the cause-and-effect testing commence. To comply with the requirements of BS 5839-1, each of the inputs (causes) should be tested to verify that the associated outputs (effects) operate in accordance with the cause-and-effect scenarios.

4.87 The appointed designer/specialist must make sufficient allowance for time, resource and out-of-hours working within the project costs to satisfactorily complete all cause-and-effect attendances and test scenarios required.

4.88 Once all the required tests have been completed (including any recorded failures rectified and retested), the test sheets should be dated and signed off by the appointed designer/specialist and copies issued to the healthcare organisation and/or their appointed representatives for final verification.

4.89 The healthcare organisation (as part of their assurance process) may require the cause-and-effect testing to be witnessed by an independent party or Authorising Engineer who should be appointed by the healthcare organisation to act as the client's representative.

Communication with the fire and rescue service

4.90 When a fire alarm activation or fire occurs in patient access areas, the fire and rescue service are to be summoned in line with the emergency plan. It may be necessary to arrange the fire alarm signals to be transmitted to the fire and rescue service automatically (for example, via a remote alarm receiving centre).

4.91 An emergency plan can support delaying a call to the fire and rescue service for a short period of time to allow investigation and/or confirmation that the fire and rescue service is required. Such an approach should always be used in conjunction with a system such that the activation of a second detector or manual call point or a call on the emergency number to switchboard overrides the delay and results in an immediate call to the fire and rescue service. Where more than one detector or a multi-sensor device activates, this should be considered as a confirmed fire, and the fire and rescue service should be summoned. The activation of a call point should result in an immediate call to the fire and rescue service unless explicitly detailed in the fire strategy.

4.92 Where a delayed call to the fire and rescue service is to be employed, a robust protocol should be established and disseminated to all staff concerned to ensure that the appropriate procedures are followed for each alarm signal generated.

4.93 Remote centres may include:

- healthcare premises such as an ambulance control centre or a permanently staffed telephone switchboard or potentially another healthcare facility

- commercial alarm receiving centres (ARCs).

4.94 Where other healthcare premises are used, the standards of service and facilities offered should be equivalent to those of ARCs. Preference should be given to ARCs that have third-party certification.

4.95 The fire alarm system should be connected to an ARC unless it is monitored in a location that is continuously staffed on a 24-hour basis by at least two persons whose duties include summoning the fire and rescue service.

4.96 The method of transmitting alarms to the remote centre should be by a robust and reliable continuously monitored connection. Radio networks may be used if there is regular monitoring and testing of the communications path and the system is of proven reliability.

4.97 New remote ARCs should be designed and operated in accordance with BS 8591 and BS EN 50518.

5 Technical recommendations

Manual call points

5.1 Although BS 5839-1 generally permits a 45-metre maximum distance of travel between any point in a building and the nearest manual call point, in patient access areas much shorter distances are usually appropriate. The reason for this is that, in these areas, if fire occurs it is essential to minimise the time between discovery of the fire and raising the alarm, in order to facilitate rapid attendance by trained staff and the fire and rescue service. It is also important to minimise the time taken to reach the nearest call point so that the person discovering the fire can, if appropriate, quickly return to the scene to assist in evacuation of patients or extinguishment of the fire.

5.2 Similar considerations make it appropriate in patient access areas for the manual call points to be located on the accommodation side of exits to protected stairways (usually in conjunction with fire extinguishers) rather than on the stairway landings. Siting manual call points on stairways is also likely to be inappropriate because, in multi-storey patient access areas, there will normally be a two-stage alarm. If people moving down the stairway operate a call point on a floor below the floor of fire origin, an evacuation signal may be given in inappropriate areas, while no evacuation signal may be given where it is required.

5.3 To ensure that the appropriate alarm signal is given in each area, and that a reasonably accurate indication of the location of the fire is given at the fire alarm indicating equipment, manual call points should also be sited on both sides of main doorways between alarm zones (that is, on each direction of approach). This is particularly important in the case of main doorways between compartments and between sub-compartments. Care should be taken to ensure that these are clearly visible, especially in the case of double-swing doors. They should also be mounted and protected as far as reasonably practical (such as manual call point covers/lift flaps) to avoid accidental activations. See paragraph 8.39 for practical steps to reduce the incidence of false alarms.

5.4 With the above exceptions, the type, siting, and location of manual call points should be in accordance with the recommendations of BS 5839-1 unless a robust risk assessment is provided to support a variation from the guidance.

5.5 Throughout healthcare premises, manual call points should be installed at a height of 1.2 m above finished floor level. Consideration should be given to protecting the surface-mounted devices from accidental damage due to the movement of hospital beds and equipment trolleys around the premises (see paragraph 8.39).

5.6 In non-patient access areas, manual call points should be sited in accordance with the recommendations of BS 5839-1.

5.7 In patient access areas, manual call points should be sited as follows:

- at or close to each nurses' station

- at each exit to a stairway (but not normally on stairway landings)
- on both sides of main doorways between alarm zones (near the doors).

5.8 The provision of manual call points in mental health facilities should recognise the potential for undesirable actuation. In many cases appropriate siting in staff areas, the provision of lift flaps, or lift flaps combined with a local alarm device are sufficient to control the possibility of undesirable actuation by service users. Care should be taken in specifying lift flaps in patient access areas to ensure that patients are not able to use them to cause harm to themselves or others.

5.9 In certain circumstances where, due to the risk of false alarms due to the service-user profile and the operation of manual call points and where all other preventative measures have failed, the use of key-operated call points may be considered appropriate and supported by a local risk assessment.

5.10 In mental health units, the type of manual call point and its siting may deviate from the recommendations of BS 5839-1 if false alarms are likely to occur due to deliberate operation of call points by service users. In these cases, manual call points need not comply with BS EN 54-2 or be readily accessible to patients. However, the call points should be easily and quickly accessible to staff. See also Chapter 10.

Automatic fire detectors

5.11 Normally, the use of point-type smoke detectors is appropriate in all areas in which this HTM recommends the provision of detectors. Exceptions are areas in which the use of smoke detectors would result in constant false alarms (for example, kitchens or some plantrooms). In these areas, point-type heat detectors should be used.

5.12 Smoke detectors should normally be of the optical or multisensory type to avoid false alarms. The guidance in BS 5839-1 on detector selection should generally be followed. The choice of detector should consider both the nature of the fire load (and hence the likely type of fire) and the importance of avoiding false alarms (see Chapter 8). The deployment of multi-sensory detectors means that the system can detect fires earlier and avoid false alarms to a greater extent. The use of ionisation detectors should be avoided as they contain radioactive materials making their disposal difficult. Their use is being phased out and they are not recommended.

5.13 Other types of fire detection are likely to be appropriate only in special circumstances. For example, beam-type smoke detectors may offer efficient, economical fire detection in a large, open-plan areas. Linear heat detectors may be suitable for use in service tunnels. Flame detectors may be considered if, for example, the materials likely to be ignited are low-flashpoint flammable liquids. Aspirating smoke detection may be used for protection of critical equipment rooms (such as computer rooms) or in areas where regular access for testing of the detectors is problematic due to access restrictions. The selection of detector for each location should be appropriate and should be clearly identified and reviewed during the design and planning stages.

5.14 Where automatic door releases are interfaced with the fire detection system, it is essential that early detection is achieved to ensure their release, preserving compartmentation and delaying the spread of fire and smoke. L1, L2 and L3 category systems would normally provide sufficient detection; however, where this is not the case, detectors should be provided on both sides of the door at an appropriate distance. Detectors that comply with BS 7273-4 should be installed for use with automatic door release mechanisms.

Audible and visual alarms

5.15 The devices used to produce the audible alarm may be bells or electronic sounders.

Electronic sounders having an adjustable sound output may be more beneficial in many circumstances. It is important that there is a common sound and, therefore, only one type of device should be used. Since much of the equipment used in modern healthcare environments includes monitoring systems with audible alarms, careful consideration should be given to the fire alarm sound and any potential confusion with equipment alarms. This includes other audible alarms in building services plant areas for equipment failure, gas leaks, water leaks, carbon monoxide detection and critical unscheduled maintenance activities.

5.16 The same type of audible alarm device should be used throughout the healthcare premises (that is, either bells or electronic sounders). Voice alarm systems provided in only part of the healthcare premises may be used to give warning, provided that any messages are preceded by an alarm sound identical to that generated by the audible alarm devices used elsewhere in the healthcare premises.

5.17 As it is only staff that need to be alerted in many patient access areas, there is little benefit to be gained from generating spoken messages through a voice alarm system. However, there may be some benefit in the installation of voice alarm systems in areas where large numbers of the public congregate (for example, out-patients, cafes and reception areas), and they should comply with BS 5839-8 unless local voice messaging can be achieved via interfacing directly with the fire detection system.

5.18 In some areas where a fire alarm may cause anxiety to services users, for example, alarm devices should be of reduced volume and capable of alerting staff without causing unnecessary anxiety to the service users. The use of sound devices capable of broadcasting a pre-recorded message may be appropriate. Such devices pre-recorded with a short clip of music are considered beneficial in circumstances where a discreet staff alarm is necessary.

5.19 The use of visual alarm devices should be carefully considered. Many patients exhibit photosensitivity; hence, the inappropriate use of flashing beacons may lead to adverse patient reaction. This needs to be carefully considered at the design stage.

5.20 Visual alarm devices should be provided in areas where ambient noise levels exceed 90 dB(A) and in other areas where hearing protection is likely to be used under normal circumstances.

5.21 A sufficient number of visual alarm devices should be installed and distributed so that they are visible from all normally accessible locations. Visibility should be maintained throughout the area under normal ambient lighting levels.

5.22 Visual alarm signals should be provided in accordance with the requirements of BS 5839-1 and BS EN 54-23.

5.23 Visual alarm devices should comprise flashing lights, preferably white or red or both red and white, although white is preferable. Other colours may also be used if required to distinguish them from other visual alarms. Visual alarms should normally incorporate a sounder of low sound output (for example, 50 dB(A) at 1 m) which should be similar in output to that of the main alarm devices.

5.24 Consideration should be given to the potential for adverse reaction to flashing lights by those with photosensitivity. In any case, the flash rate should be in the region of 30 to 120 flashes per minute. Care should be taken not to confuse fire alarm visual alarm devices with other visual alarms in building services plant areas for monitoring equipment failures, gas leaks, water leaks, carbon monoxide detection and critical unscheduled maintenance activities, etc. In some circumstances, labelling the visual alarm with the word “FIRE” may be appropriate.

Radio-linked systems

5.25 A well-designed and engineered radio-linked system could offer several advantages, such as ease of installation. These are discussed in BS 5839-1. Their main disadvantage in the past has been the need for periodic replacement of batteries, which may prove expensive and inconvenient in a healthcare setting. Modern systems purport to have a battery life of up to ten years which reduces this disadvantage. It is also known that systems are now being produced that comply with the specific recommendations of BS 5839-1 relating to radio-linked systems.

5.26 It is not intended that this HTM should constitute an obstacle to the use of radio-linked systems, provided the selected system is well-proven and reliable and meets all existing standards. There are many situations where a radio-linked system will prove advantageous. For example, radio-linked systems reduce the need to run cables to each individual device on the fire alarm system. This can reduce the costs, disruption and timescales associated with the project. The reduction in wiring between detectors can also minimise the time spent in patient areas or ceiling voids and therefore has some patient care and infection control benefits. Due to the flexibility and ease of installation, radio-linked systems can be easily relocated if departments are changed or refurbished, meaning they are more adaptable and flexible, which will have potential longer-term cost savings in a healthcare setting.

5.27 Wherever radio-linked systems are being proposed, the environment should be adequately surveyed to ensure the connectivity and robustness of radio communications alongside the potential cumulative effects of other existing or proposed wireless transmission systems. Such a survey should consider:

- the potential for radio frequency interference to other systems derived from the radio-linked system emissions
- the potential for radio frequency interference from other systems derived from the radio-linked system susceptibility
- the potential for data packet collisions with other existing data systems or those proposed.

5.28 Subject to compliance with BS 5839-1 and this HTM, radio-linked systems may be used to provide temporary protection in healthcare premises. Such protection may be of value during contractors' operations in, for example, an area under refurbishment where the normal system may not be operational, or during the construction of a new building. Temporary cover may also be useful during the replacement of an existing fire alarm system, for example, before the new system is fully operational.

5.29 Permanent use of a radio-linked system should only be considered if the system is well-proven and is independently certificated to BS EN 54-25 and listed in BRE's LPCB Red Book Live. Any system proposed should be shown to comply in full with all recommendations of BS 5839-1 and this HTM. The proposed use of the system should be fully supported by the detailed site survey as described above.

Electromagnetic interference

5.30 Electromagnetic interference (EMI) can lead to false alarms. The most practical and reliable way to prevent possible EMI is to use shielded fire alarm cabling. In healthcare premises, there are often numerous sources of interference including from treatment of patients (for example, diathermy equipment).

5.31 All systems should comply with the requirements of the Electromagnetic Compatibility Regulations 2016 and BS 5839-1.

5.32 Installation design and installation practices should be such as to minimise the

susceptibility of the installation to electromagnetic interference. Care should be taken in the selection of cable, the continuity and equipotential of screens along their length, the bonding of metal parts, such as the door of a control panel and the panel's enclosure, and the termination of cables.

5.33 Account should be taken of the guidance contained in HTM 06-01, which deals with the abatement of electrical interference.

Power supplies, cables and interconnections

5.34 The reliability and integrity of both the main and standby power supplies to the fire detection and alarm system should be of a high standard. It should not be assumed that the presence of two supplies (main and standby) is any justification for the reliability of either supply to be reduced.

5.35 The mains supply to the fire detection and alarm system should be derived from the healthcare premises' essential services (automatically started standby generator-backed) supply.

5.36 The number of isolating devices between the incoming supply to the healthcare premises and the fire alarm control and CIE should be kept to the minimum practicable.

5.37 From the point at which the supply is provided with the dedicated isolating-protective device described in BS 5839-1, the circuit should be treated as a Category 3 circuit as defined by the current edition of BS 7671 (IET Wiring Regulations). Accordingly, the circuit should be suitably segregated from other circuits.

5.38 All cables associated with the fire alarm system, including power cables and interconnecting cables with third-party equipment, should as a minimum be rated fire-resistant to BS 7629-1 as described in BS 5839-1, section 2, clause 26.2 and recommended in part (c) (3) of that clause. Mechanical protection for cables must comply with the recommendations of section 2, clause 26. In unsprinklered complex hospital premises where evacuation is not simultaneous, BS 5839 recommends the use of enhanced fire-resisting cables.

5.39 Standby battery supplies for any part of the system should be capable of maintaining the system in normal operation for at least 24 hours, after which there should be sufficient capacity to operate all sounders in the evacuation mode for at least 30 minutes. If it is likely that the building is going to be regularly unoccupied for longer than 24 hours, an assessment should be made as to the required capacity for the batteries to suitably protect the building. See also BS 8519 on the selection and installation of fire-resistant power and control cable systems for life safety, fire-fighting and other critical applications.

5.40 Where cables run externally and are subject to sunlight, they should be suitable for such use so as not to be degraded by ultraviolet (UV) light. They should have a UV-resistant sheath or be shielded from sunlight within suitable containment.

6 Commissioning and handover

Commissioning and handover training

6.1 The process of commissioning involves thorough testing of the installed system to ensure that it operates correctly in accordance with the recommendations of this standard and with the purchasing specification/original client brief. At completion of commissioning, it also needs to be confirmed that all relevant documentation has been handed over to the user. This is required to ensure they can use, test, monitor and maintain the system correctly.

6.2 The commissioning plan should be continually reviewed and updated throughout the planning, design and project milestone stages of any new or refurbishment project or fire alarm system alteration. Cooperation between all parties will be required to ensure success.

6.3 The organisation responsible for commissioning the system should be clearly defined at the start of the project. See also BS 5839-1.

6.4 Any project commissioning plan should include, but not be limited to, the following:

- commissioning scope
- project description and agreed brief
- project team members, stakeholders i.e., roles and responsibilities – responsible persons
- commissioning tasks and schedule of tasks
- commissioning completion documentation
- initial cause-and-effect testing based on the matrix
- healthcare organisation representative training – recorded and future renewal/ continuity (succession planning)
- systems training dates to be agreed in advance of practical completion
- attendees to be verified, contact details provided and training recorded
- handover documentation to be submitted and reviewed as part of training.

Responsible persons

6.5 The roles of the responsible person are:

- to ensure that the fire alarm system is designed, installed, commissioned, managed and maintained in accordance with BS 5839-1 to minimise the potential for false alarms and UwFS
- to ensure that the healthcare organisation selects appropriate persons/organisations that have relevant experience and valid third-party certification
- to establish a level of cooperation with installers and or maintainers and monitors to support the above

- to have effective procedures in place so that an alarm activation is managed appropriately to minimise false alarms and UwFS calls and ensure, as much as reasonably possible, that a call being passed to the fire and rescue service is a fire event.

6.6 The responsible person should nominate a single, named member of the premises management who should be appointed to supervise all matters pertaining to the fire detection and alarm system as specified in BS 5839-1.

Commissioning contractor

6.7 The appointed contractor/specialist should be responsible for the commissioning, testing, and bringing into use of the fire detection and alarm system works.

6.8 The appointed contractor/specialist should provide a detailed schedule of commissioning activities and include timelines and resource allocation for each activity.

6.9 All commissioning should, as a minimum, fully comply with BS 5839-1, Section 5 (all parts).

6.10 Where the appointed contractor is not the fire detection system specialist or product manufacturer/supplier and has only been appointed on the basis for providing the installed works, then the appointed contractor should engage the services of a specialist or product manufacturer/supplier to carry out all commissioning, testing and programming of the installed and/or amended works. Any specialist working on the fire alarm system should have demonstrated they hold the required level of competence.

6.11 All new fire panels should be fully commissioned, tested and programmed, including the functional testing and 100% verification of all devices. If a site-wide network system is in place, any new fire alarm panels should first be tested in isolation. Only after approval from the healthcare organisation should a new panel be connected to the existing site-wide network infrastructure.

6.12 No fire panel (or part thereof) should be brought into use without the contracted scope of works being witnessed by the healthcare organisation and/or their appointed representative or Authorising Engineer.

6.13 The appointed contractor/specialist should produce a detailed commissioning programme that should be accepted by the healthcare organisation and/or their appointed representatives prior to any commissioning works taking place.

6.14 The appointed contractor/specialist should coordinate with the healthcare organisation any attendances required for witness testing or departmental liaison.

6.15 The appointed contractor/specialist should cordinate all the commissioning activities with the healthcare organisation and all the relevant project stakeholders/affected departments.

6.16 The schedule should be further developed by the appointed contractor/specialist with the healthcare organisation and/or their appointed representatives during the course of the contracted works (if applicable).

6.17 The appointed contractor/specialist should be responsible for the 100% testing of devices back to the CIE.

6.18 Fire panels should not be connected to any existing fire system network without the authorisation of the healthcare organisation and/or their appointed representative.

6.19 The appointed contractor/specialist should be responsible for producing all “text descriptor” labels that are to be programmed into the fire system, detailing the unique location of each device on the fire detection loop circuit(s). The “text descriptor” labels should be reviewed and accepted by the healthcare organisation and/or their appointed

representative prior to being downloaded into the fire control panel(s).

6.20 The appointed contractor/specialist should be responsible for all third-party interfacing to ensure that all ancillary items of equipment have been physically interfaced correctly to the fire detection loop circuit and programmed. The responsible person should also ensure that any device connected to the fire alarm system should operate in accordance with the cause-and-effect.

6.21 Sound pressure testing should be carried out to ensure correct levels of audibility are achieved in all areas. The results of such tests should be recorded on the as-fitted record drawings produced by the appointed contractor/specialist.

6.22 Sound pressure tests should need to be coordinated with the healthcare organisation. Sound pressure levels should meet the requirements of this document and/or BS 5839-1, Section 2.

6.23 Sound-pressure measuring equipment should be within calibration and all calibration certificates should be included within the operating and maintenance manuals along with a record of the results.

Commissioning and handover documentation

6.24 At the end of the contract works phase, the fire alarm system should be satisfactorily commissioned and fully tested, and its operation demonstrated to the healthcare organisation's person responsible for fire alarms and Authorised Person (LV) as appropriate. This includes demonstration of the fire alarm system interfaces identified on the cause-and-effect matrix.

6.25 At the commissioning stage, a check should be carried out to ensure that there is no obvious potential for false alarms. As evidence of compliance with this recommendation, the completion of the check should be recorded on the commissioning certificate.

6.26 Adequate records and documentation need to be provided. All project documentation, project certification and record drawings of the new or modified fire alarm system should be presented to the healthcare organisation as part of the project and operation and maintenance manuals. Reference should also be made to BS 5839-1.

6.27 Commissioning should be completed in accordance with BS 5839-1 and the requirements agreed at the start of the project by way of a commissioning checklist. It is the responsibility of the commissioning engineer to verify that the system operates correctly, including cause-and-effect, as designed. The commissioning engineer should be competent to do so, and this should be demonstrated to the healthcare organisation.

6.28 The healthcare organisation's estates sector lead/Authorised Person and their staff should also be given sufficient training on the management of the system as part of the contract package of works.

6.29 At the end of any project at handover, the following should have taken place:

- The engineering installation has been completed and defects corrected to the satisfaction of the healthcare organisation's lead engineer/Authorised Person and the contract administrator. No further disruptions or system downtime to the site are required at that point.
- Commissioning and testing reports have been provided and accepted in writing by the healthcare organisation's lead engineer/Authorised Person as being satisfactory.
- Performance and Acceptance Tests have been carried out to the satisfaction of the healthcare organisation's lead engineer/Authorised Person.

- The system has been witnessed and accepted by the healthcare organisation or its approved representatives.
- As-installed drawings which accurately reflect the fire alarm installation and cable routes have been provided to the healthcare organisation's lead engineer/ Authorised Person. The drawings should be suitable, consistent and at the agreed size/scale, and clearly show all the fire detection devices and their locations. All devices, panels and equipment should be uniquely referenced including circuit references and dependencies.
- Operating and maintenance manuals have been provided in both hard copy and electronic format to the healthcare organisation's lead engineer/Authorised Person. These should include the necessary project documentation, system specifications, accepted variations and design/testing/ commissioning certification associated with the fire alarm system package of works.
- The operating and maintenance manuals include a full description of the operation of any staff alarms, time delay systems and/or staged alarms to ensure that appropriate response procedures can be recorded as part of the emergency plan and appropriate staff training carried out.
- The appropriate estates staff have been formally instructed and trained in the correct operation of the installation. A record of the instruction, dates and attendees should be included within the project documentation.
- Instruction and training in the correct use, operation and routine maintenance of the installed systems should be given as appropriate to the following staff groups:
  - the end-users
  - those who will operate and maintain the installed system.

Operating and maintenance manuals

6.30 The provision of comprehensive and satisfactory operating and maintenance manuals is a critical part of the works and forms one of the contractor's obligations under the Construction (Design and Management) Regulations 2015 (CDM).

6.31 The operating and maintenance manual should be provided in its primary form as an electronic document. All information therein should be in original digital form. The contents of the manual should be set out in a logical sequence, each section of the manual being fully indexed for quick reference.

6.32 The contractor should provide a hard copy of the operating and maintenance manual in addition to the electronic copy.

6.33 The manual should follow the guidelines set out in CIBSE Technical Memorandum TM 31 and BSRIA Guide BG 79/2020 covering handover documentation. It should include, but not be limited to, the following sections:

- the purpose of the installation
- installation records
- system documentation and certification
- certificates of conformity/certificates of compliance (if applicable)
- certificates for the design, installation and commissioning of the system
- the equipment provided includes detector types, cable types, controls, selection and configuration
- record drawings including the positions of all controls, indicating power supply requirements
- record drawings including manual call points, fire detection and fire alarm

devices including the type sizes and actual routes of cabling. All devices and loops to have unique references

- cause-and-effect matrix and testing/ commissioning information
- simple schematics/floors plan of the system for locating beside the CIE and other key reference points
- records of the positions of all equipment that may require routine maintenance
- recommended testing, servicing and maintenance requirements
- investigation and avoidance of false alarms
- description of the installation including a record of any agreed variations from the scope
- how the installation is to be used
- how to keep the installation maintained and operational
- maintenance schedules including logbook
- information on how the installation may be changed
- disposal of the installation
- recommended spares
- hot works and fire alarm isolation.

7 Maintenance

7.1 The following sections modify the guidance in Section 6 of BS 5839-1 on maintenance.

Authorised Person (Fire Safety Maintenance)

7.2 In addition to the Authorised Person (Fire) described in HTM 05-01, this document introduces the new role of Authorised Person (Fire Safety Maintenance).

7.3 Where necessary, this function may be shared by more than one person.

7.4 In addition to appointing a competent person as required in FSO Article 18(1), for large sites with extensive fire alarm systems consisting of multiple panels, an Authorised Person(s) (Fire Safety Maintenance) should be designated who has extensive knowledge of the system. This person should be directly employed by the healthcare organisation and their roles will include:

- briefing and liaising with design teams/ project stakeholders, receiving and reviewing proposed design and handover documentation
- reviewing and commenting on proposed design variations from HTM 05-03 and BS 5839-1
- reviewing and verifying contractor accreditation and competence is valid and appropriate for specified works (for example, third-party certification to appropriate scope)
- being an attendee at the fire safety committee meetings
- ensuring compliance with HTM 05-03 Part B
- liaising with the fire alarm company (competent person)
- ensuring that any changes to the premises or changes of use are in line with HTM guidance and do not compromise the existing fire detection and alarm system
- forming part of the fire response team and attending any actuations of the fire alarm
- in conjunction with the Authorised Person (Fire), investigating any false alarms with a view to reporting their cause and reducing their incidence as far as reasonably practical
- overseeing the fire alarm isolation permit system
- checking and responding to faults regularly
- ensuring an appropriate permit to work system is maintained for contractors including hot works
- ensuring critical spares are available
- ensuring the correct level of testing is being successfully completed
- ensuring that a suitable emergency plan is in place to cover the non-functioning of part of the fire alarm system

- preparing an annual report to be available to the director with fire safety responsibility on the fire alarm system to include required maintenance and the incidence of false alarms
- at least annually, ensuring that the items in BS 5839-1, Section 45.3(b), are checked.

Scope of maintenance

7.5 This guidance is intended for use in complex healthcare premises provided for in-patient treatment or care utilising progressive horizontal evacuation in the fire strategy. It is to be used where fire alarm systems are self-monitoring and the standard of alarm fitted is generally to L1, although there may be variations to this standard.

7.6 Complex healthcare premises primarily include hospitals where patients are undergoing treatment or care that will require them to be accommodated overnight, sometimes for extended periods of time. The nature of such care has specific IPC requirements. The environment will be different from that typically found in an office or factory, and the risk posed to patients by the intrusion of fire alarm engineers may outweigh any benefits to be gained. Therefore, fire alarm engineers accessing patient care areas should complete an IPC risk assessment in conjunction with the IPC team before carrying out any work. This should be reflected in any risk assessment and method statement (RAMS).

7.7 Section 6 of BS 5839-1 covers the maintenance of fire alarm systems, which in many cases may not be appropriate for complex healthcare premises. Variations from BS 5839-1 should be recorded in a protocol, supported by evidence and a risk-assessment approach. This protocol should adhere to Appendix E in HTM 05-01.

7.8 Modern fire alarm systems incorporate a high degree of monitoring so that the individual components of the system undergo continuous monitoring such that either (a) faults are automatically identified or (b) the system can be interrogated to identify components that are outside of normal parameters.

7.9 The cause-and-effect of the fire alarm in such premises will be extensive with, in some cases, hundreds of different fire zones with cause-and-effect schedules running into thousands of lines. Complex healthcare premises are almost constantly undergoing change and it is not unusual for fire alarm software and documentation to not be modified appropriately.

7.10 The “weekly test by user” as detailed in BS 5839-1 may prove ineffective in a hospital where there can be hundreds of different detection zones and thousands of call points. The actuation of one call point would only be heard by a tiny fraction of staff and would not therefore serve its dual purpose of informing staff of the sound of the alarm and checking the audibility of the alarm. It should be ensured that during fire training for staff, they are made aware of the sound of the alarm at least annually.

7.11 Ancillary devices such as door release mechanisms are often checked during the weekly fire alarm test. If this test is not completed, ancillary devices should be checked monthly or in line with a risk assessment; in some cases their criticality may require more frequent testing (see HTM 05-03 Part K). These should be the subject of a protocol as detailed in Appendix E of HTM 05-01.

Testing by user

7.12 The user is a person local to the site who has received some level of instruction in the fire alarm system, which may be provided by the Fire Safety Adviser or Authorised Person or Competent Person. They may be ward or department staff, Fire Wardens, security or portering staff or estates and facilities staff. They may be the Authorised Person (Fire) or

the Authorised Person (Fire Safety Maintenance). In the case of multi-occupancy, the user may be the person designated by the responsible person (as defined in Article 3 of the FSO). It is important that the instruction given to the user is recorded.

Daily testing by user

7.13 The fire alarm panel should be checked to ensure that there are no new faults and that any isolations are authorised.

Weekly testing by user

7.14 Unless there are critical systems/areas which require such testing, or the maintenance strategy/protocol requires it, the weekly test as described in BS 5839-1 may be ineffective in a hospital with several thousand call points and numerous alarm zones. A risk-assessed approach may reduce or eliminate the necessity for weekly testing.

Monthly testing by the user

7.15 Where feasible and in line with the healthcare organisation's protocols, a visual check should be made of all fire alarm detectors and call points and sounders to ensure:

- they are unobstructed and that call points can be easily seen
- they are in apparently good condition and undamaged
- detectors do not have any stacked storage within 500 mm of the device and that no storage close to the detector is within 300 mm of the ceiling
- detectors are not covered and that smoke is not prevented from entering the detector.

7.16 These checks can be incorporated into monthly checks completed by Fire Wardens. In areas where there are no Fire Wardens, it should be ensured that the checks are completed (for example, in areas such as common parts and plantrooms).

Inspection and servicing by a Competent Person

7.17 The guidance in Section 6 of BS 5839-1 is modified by paragraphs 7.18–7.20.

7.18 In fire alarm systems which continually monitor detectors and faults, or in which warnings are annunciated, the following clauses in BS 5839-1 may become unnecessary subject to the cause-and-effect testing described in paragraph 7.20:

- Section 45.4 a) b) c) d) j).

7.19 In certain situations, BS 5839-1 states that "the testing of one cause and its effects may be satisfactory" but this is not the case in complex healthcare buildings. The cause-and-effect testing should be sufficient to give confidence that the fire alarm and associated devices are working. That is, on-going testing and maintenance should be set at a level which provides confidence in the system. If an unacceptable percentage of devices requires maintenance such that they would not operate effectively, the scope of the testing and maintenance should be increased to a point that there is confidence in the system.

7.20 In addition to the guidance in BS 5839-1, the following should be implemented:

- The cause-and-effect schedule for the system should be available and there should be confidence in the schedule. The schedule should have been fully tested and proved prior to project handover. Where the following is in place the cause-and-effect should be checked:
  - any significant changes have occurred in the past 12 months
  - fire door release mechanisms which only operate on activation of detectors on either side of the door

(as opposed to those that operate on activation of any device in that zone).

- A percentage of the cause-and-effect is to be tested annually. This should include detection devices and call points. Such a percentage is to be rotated so that different areas are checked annually or as determined by the risk-based programme which may deem that more regular testing is required. The percentage to be checked should be agreed by the Fire Safety Committee with relevance to the specific site and system. Where the checks uncover significant discrepancies, the percentage to be checked should increase accordingly.

Recording of maintenance

7.21 In addition to the guidance in BS 5839-1, records of maintenance should be kept for a reasonable period to allow the local fire and rescue service to ensure a satisfactory standard is being followed.

Certification of maintenance

7.22 The inspection and servicing certificate (as indicated in BS 5839-1, Appendix G6) should have included in the section marked "variations from the recommendations of clause 45" the following: "variations as detailed in HTM 05-03 Part B".

7.23 When selecting a fire detection system, the initial cost of purchase only represents a small proportion of the true cost of the system throughout its lifetime. The cheapest product in terms of capital expenditure may not deliver best value throughout the entire system's life i.e. the whole life cost, especially when taking into consideration maintenance costs.

7.24 There are several factors associated with fire detection that should be taken into consideration at the specification and procurement stages to determine the total lifetime cost, such as maintenance, disposal, and future upgrade of the system:

- What is the manufacturer's upgrade policy, and will compatibility be maintained?
- What are the maintenance implications for this system and who can carry out this work?
- What are the timescales for equipment obsolescence?

7.25 An analytical procedure is required for conducting life-cycle cost (LCC) analyses of fire safety systems in new and existing healthcare facilities.

7.26 Comparative LCC evaluations of alternative fire safety systems can be obtained based on their initial costs, useful lifetimes, operation and maintenance costs, salvage values and corresponding fire insurance costs for the building and its contents. A standardised methodology for carrying out LCC is provided within PD 156865.

8 False alarms and unwanted fire signals

8.1 This chapter sets out recommendations and guidance for the reduction of false alarms and unwanted fire signals (UwFS) generated by automatic fire detection and alarm systems.

8.2 Fire alarm systems should be appropriately managed by the responsible person. There is an important distinction between a false alarm and unwanted fire signal:

- A false alarm: activation of the fire detection and alarm system from a cause other than fire.
- An unwanted fire signal (UwFS): the point at which a false alarm results in a request to the fire and rescue service to attend.

8.3 While not all calls to the fire and rescue service from a healthcare premises will come from an NHS-managed response to a fire alarm activation, it is clear that appropriate fire alarm design, installation, testing, maintenance and management practices can significantly reduce the amount of UwFS. The inherent size and complexity of many healthcare facilities, and the vulnerability of patients, means that large and complex fire detection and alarm systems are installed at healthcare premises. The number of devices on the system means there is an increased possibility of false alarms. However, this should not be taken as inevitable. Appropriate design, installation and maintenance have an important part to play in reducing both false alarms and UwFS. The appropriate management response and procedures for false alarm activations will also have a vital role to play.

8.4 Although this HTM recognises the complete elimination of false alarms is a theoretical target, each healthcare organisation should continuously strive for their elimination through careful design, appropriate equipment selection, adequate reporting, recording and then investigation and rectification of the causes of false alarms. Investigation and reporting of incidents may allow the causes of previous false alarms to be identified and tackled accordingly. Sharing this data across healthcare sites using common, recognisable metrics will also be beneficial.

8.5 All false alarms (including unwanted fire signals) should be reported annually as part of Estates Return Information Collection (ERIC) returns.

8.6 In any building, false alarms can result in disruption and loss of confidence in the fire alarm system. In premises where treatment is being provided, the disruption can be detrimental and affect patient care. Since immediate and appropriate response in the event of fire is essential to the safety of patients, any loss of confidence in the system, including from repeated false alarms, can rapidly result in a lowering in the standard of fire safety. It is therefore essential that the installation design be such as to avoid false

alarms, as far as reasonably practicable. However, avoidance of false alarms should be balanced against the need for effective detection and early warning in the event of fire. False alarms can impact directly on the treatment, care and well-being of patients and may result in considerable disruption to appointment systems, out-patient and in-patient care, accident and emergency departments and treatment regimens generally. Where UwFS are persistent, they can erode and undermine staff morale. This can also lead to a loss in confidence of the fire alarm system with the risk that people will not respond appropriately when a fire detection and alarm system raises an alert to a real incident.

8.7 UwFS are also disruptive and costly to the fire and rescue service. They can divert essential fire and rescue service resources from real emergencies, putting life and property at risk. They cause unnecessary risk to fire crews and members of the public while responding to an UwFS.

8.8 BS 5839-1 states that the responsibility for limitation of false alarms and UwFS rests with every party involved in the specification, design, installation, commissioning, management at operational level and maintenance of the fire detection and fire alarm system.

8.9 The most common causes of UwFS are poor product selection and system design, inappropriate installation, the activities of people or processes within the building and inadequate system maintenance.

8.10 Where any alteration, replacement or addition to a fire detection and alarm system is proposed, the previous site records, reports and reasons for false alarms and UwFS should be identified by the healthcare organisation to the project team as part of the project brief during the planning stages on each project.

General application

8.11 This section provides guidance in respect of the measures necessary to identify, control and reduce false alarms in healthcare premises. The guidance is intended to reduce the burden placed on healthcare organisations and the fire and rescue service by avoidable false alarms and UwFS. It provides guidance on the causes of false alarms and practical guidance for reducing their occurrence. In addition, guidance is included in respect of the management of false alarms.

8.12 It reflects the policy by the National Fire Chiefs Council (NFCC) for the reduction of false alarms and UwFS. The recommendations should also be read in conjunction with the guidance contained in BS 5839-1. The recommendations cannot take account of all situations. It is therefore incumbent upon the healthcare organisation's management to ensure that full consideration has been given to any problem and its resolution.

8.13 BS 5839-1 defines the causes of false alarms into the following main categories:

- where the fire detection system has responded as would be expected to an environmental cause, such as smoke or aerosols, accidental damage, or inappropriate human activity (for example, an activation caused because of a failure to isolate an alarm during testing)
- any equipment faults
- an activation such as the operation of a call point where there is no fire, or a person has acted with malicious intent
- an activation where a call point is activated because the person has a genuine reason to suspect that there is a fire – the person has acted with good intent.

See Figure 3.

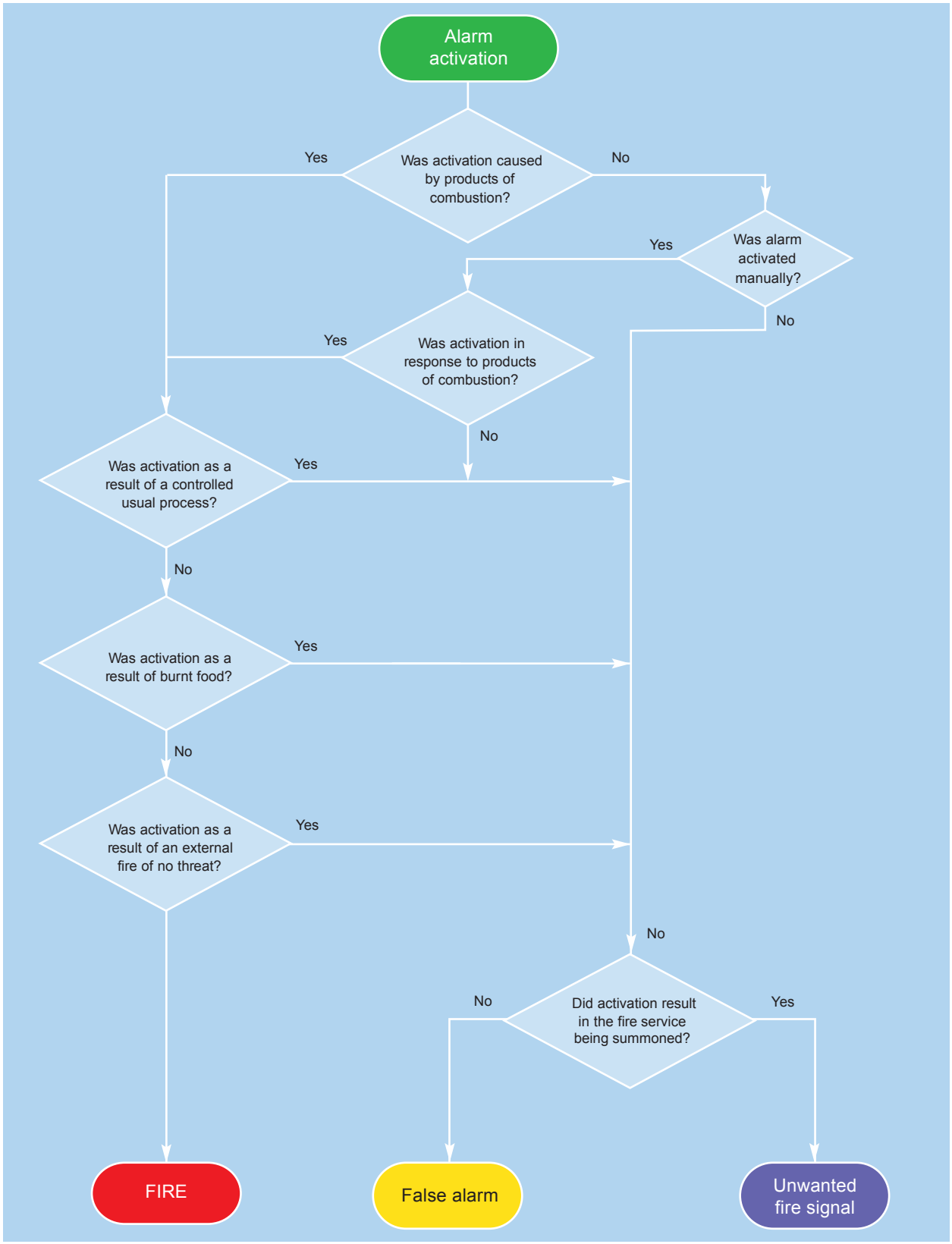


Figure 3 Incident classification decision tree

8.14 False alarms should be categorised using universal references to:

- identify their causes
- record and report their occurrence and
- allow appropriate actions to ensure they do not reoccur.

8.15 Following any false alarm, an investigation should take place to identify the cause. The "categories of false alarm" should be used to ascertain the class of cause of the incident. These categories should be used in all false alarm recording and reporting (see Chapter 11).

Reducing the number of false alarms

Management responsibilities

8.16 All healthcare organisations are required to discharge their responsibilities under the FSO and to ensure that risks due to fire have been adequately mitigated. A high level of false alarms is likely to be an indication of inadequately managing fire safety issues within the healthcare organisation.

8.17 The NFCC policy recognises that a high level of unwanted fire signals may be an indicator of inadequate fire safety management. It recommends that the fire and rescue service should make use of the FSO on any occasion that false alarms have a detrimental impact on the fire safety of any relevant person, to bring about improvement in fire safety management. Such an approach may ultimately lead to enforcement action under the FSO. It may also lead to financial charges being made for callouts to false alarms.

8.18 Fire safety management needs to reflect the need to target UwFS without detracting from the level of fire safety.

8.19 Every false alarm should be investigated by the responsible person, Authorised Person (Fire Safety Maintenance) or the Authorised Person (Fire), and efforts taken to identify the root cause. The investigation should include the involvement of all stakeholders and the action to be taken to eliminate recurrence.

8.20 All incidents of false alarms should be reported as soon as practicable following the incident and, in any case, within 24 hours of the incident occurring.

8.21 It is important that details surrounding all false alarm incidents are accurately recorded as soon as possible following the incident. Information recorded and/or displayed by the fire detection and alarm system is vital in positively determining the cause of alarm activation and in some cases is the only means of establishing the sequence of events. It is important that such information is preserved.

8.22 Once all relevant information has been recorded, the duty engineer should reset the fire detection and alarm system followed by, where appropriate, consultation with the fire and rescue service officer attending the UwFS incident. The fire and rescue service is not responsible for resetting the fire alarm system. A subsequent incident in the location of the activated detection device might not sound a further alarm until the system is reset. Following activation and prior to the system being reset, it is imperative that a constant watch is maintained throughout the area in which a device is activated.

8.23 Wherever possible, agreement should be reached with the fire and rescue service officer attending the incident as to the probable cause. The identified categories shown in the "categories of false alarm" table in Chapter 11 should be used to identify the cause of the incident. The completed briefing (see Chapter 13) should be submitted to the Fire Safety Manager for recording and further action.

8.24 The number of false alarms should be reported on at least a quarterly basis and

should be included in the healthcare organisation's annual report, including trends over the past three years. The Authorised Person (Fire) should include this in their audit, and it should be included in the annual internal audit as outlined in HTM 05-01.

Design

8.25 Although all stakeholders have a responsibility to eliminate false alarms, appropriate system designers can have a significant impact in avoiding false alarms.

8.26 From the initial design stages of a project, the avoidance of false alarms should be a focus. This consideration should not be limited to the design of the fire detection and alarm system but should extend to all design issues that may directly or indirectly contribute to the incidence of false alarms.

8.27 Sections 34 and 35 of BS 5839-1 provide information on limiting false alarms. In addition, where there are any alterations being made to the fire detection and alarm system, or the risk that it is intended to protect against, at the early design stage a qualitative design review (QDR) should be undertaken. This is a qualitative and collaborative process which draws on the experience and knowledge of a professional team involved in the design and operation of the building. This should include the designer, the user(s), the Authorised Person (Fire), the Authorised Person (Fire Safety Maintenance), the installer/ manufacturer, staff representative, facilities managers (both hard and soft FM) and the maintainers.

8.28 Consideration should also be given to incorporating specialists such as IPC teams and health & safety. This QDR should define performance objectives in terms of the elimination of false alarms and address methods of achieving this.

8.29 All designers should be aware of their responsibilities under the CDM Regulations and BS 5839-1.

8.30 Organisations undertaking design, installation and commissioning work have a responsibility to make sure that their work:

- meets the recommendations of the relevant code of practice
- is suitable for the building, its occupancy and its intended use and
- is designed to minimise false alarms.

If, during conducting system works, a failure or issue is identified outside the worker's area of responsibility, it is best practice to report that matter to the appropriate person responsible.

8.31 In addition to the recommendations set out in the relevant code of practice, designers and installers should, wherever possible, take advantage of modern technology which is focusing on increasingly intelligent components and systems that go a long way to preventing false alarms.

8.32 The design of the fire detection and alarm system will provide the greatest influence in potentially eliminating false alarms. Particular attention should be paid to the change of use of a room. In all cases involving a change of occupancy and/or activity, the method of fire detection within the room should be reviewed.

8.33 The advice provided below is not exhaustive, nor is it considered appropriate in all cases. Any proposal for reducing false alarms should be considered by the relevant stakeholders, and a risk assessment should be carried out where appropriate prior to the introduction of measures.

8.34 Once a fire alarm system has been installed, the ongoing maintenance and management of the system becomes a duty of the responsible person for the site. There are clear requirements for the regular testing of the system by a competent person to ensure it operates as designed. This should be extended to include effective arrangements for managing the system. These arrangements

should include prevention of the causes of false alarm calls. In addition to completing work to the required standard, fire alarm maintenance companies have a role to play in advising their clients of problems with system design, apparatus or detector selection and positioning which could lead to the system generating false alarms.

Operation

8.35 Many practical steps can be taken to reduce the incidence of false alarms, including, but not limited to the following:

- All call points should be fitted with a protective cover which is moved to gain access to the frangible element. In the case of mental health units, these may be fitted by key operation activated by staff.
- Call points can have deflection devices fitted adjacent to them to prevent impact damage.
- Processes or procedures can be relocated to prevent activation of detectors (for instance, nebulisers or reheat ovens).
- Detectors can be changed from smoke to heat or multi-function, or where possible, adjusted to suit their environment.
- Detectors can be relocated.
- Call points can be relocated.
- Where activation in staff residences or ward kitchens is caused by cooking, single-point smoke detectors (these may be battery-powered with a ten-year battery) may be fitted in addition to the main fire alarm such that they activate at a sufficiently early point to alert persons of the situation.

8.36 Some of the preceding may require an agreed variation from the guidance design standard in BS 5839-1. Any agreed variations should be recorded on the BS 5839 design certificate within the site or project documentation.

8.37 Careful consideration should be taken of the benefits to be gained by these variations in terms of reducing false alarms over the possibility of slightly extended fire alarm activation times. Any such variations should be recorded and made available to those servicing the fire alarm and fire safety inspecting officers and should be included in the fire risk assessment.

8.38 To prevent the activation of the fire alarm by contractors, there should be in place a robust hot works permit system and an isolation permit system for the fire alarm. All contractors should be subject to a general permit to work system in which nuisance activation of the fire alarm should be addressed (for example, excessive dust in the air). In some cases, temporary isolation of the fire alarm system may require Fire Wardens to mitigate the associated risk. This should be discussed and agreed with the Authorised Person (Fire) or Authorised Person (Fire Safety Maintenance) during any project implementation or pre-start meetings.

False alarms

8.39 Fire detection and alarm systems are complex electrical and mechanical systems. This is particularly true for hospital environments which require the highest level of fire detection coverage to provide appropriate protection to both life safety and business continuity.

8.40 In hospitals it is expected that the appropriate skilled personnel will be available to carry out and record the reason for any false alarms. An in-depth investigation should be the norm. As such, the level of false alarms should be reduced to the lowest level possible.

8.41 Each of the fire and rescue authorities in England produces an integrated risk management plan that sets out how it will protect the community by preventing fires,

enforcing fire safety legislation and responding to incidents. These are produced locally to reflect the needs of their local communities. As part of this process, fire and rescue authorities will put in place policies and procedures for responding to fire alarms actuations.

8.42 Each fire and rescue service considers their response strategies to UwFS to reduce the overall cost of such calls and to meet the requirements of locally determined integrated risk management plans. In addition, the Localism Act has provided fire and rescue authorities with the power to put in place a financial charging policy in support of its strategy to deal with UwFS.

8.43 Healthcare organisations should liaise with their local fire and rescue authority to understand their policy of attending fire alarm actuations and dealing with UwFS. Fire and rescue services may reduce the attendance of a call to a fire alarm actuating where continued UwFS is present. This may vary based on the use of the premises and the time of day. Fire appliances may attend at reduced road speed, i.e. not using blue lights.

8.44 The NFCC policy provides guidance on call-filtering processes and is intended to prevent continual evacuation of people or the summoning of the fire and rescue service unnecessarily. In most cases, the filtering of alarm calls is inappropriate considering the potential life-risk associated with healthcare premises and the arrangements in place for summoning the fire and rescue service.

8.45 In most hospitals providing 24-hour care, a fire alarm signal is passed to a main switchboard, either on that site or on an associated site, from where a call is made via the public-emergency 999 system. Call-filtering cannot be applied by external ARCs or telecare service providers. The internal hospital procedures reflect the information that the fire and rescue service needs to mobilise the appropriate response to the correct access location. Hospitals are often complex sites with a great variety of hazards and risk scenarios. The training of all staff who respond to fire alarm actuations is vitally important. This should reflect the need to understand the difference between a fire alarm actuation, a confirmed fire (see paragraph 8.67) and a UwFS, and the appropriate implementation of the emergency plan when responding to an activation. In particular, consideration should be given to the need to immediately call on such resources when the incident giving rise to the alarm involves no threat to patients.

On-site response to fire alarm actuations

8.46 A fire alarm system is intended to alert the occupants of a building to the possibility of a fire and to initiate the emergency plan for the building. The management response to the activation of a fire alarm will be based on the findings of the fire risk assessment and the resulting emergency plan. The fire safety arrangements in a building should always include a management system in place to check the area where the alarm has been initiated.

8.47 On activation of an alarm, the fire response team should be sent to investigate the incident without compromising their safety. Those staff sent to investigate should be appropriately trained and have sufficient means of readily contacting the central point from which the incident is being controlled. On arrival at the area where the alarm activation occurred, attending staff should communicate the status of the incident immediately to the central control point. This allows the fire and rescue service to be summoned at the earliest opportunity or the alarm to be cancelled and a call to the fire and rescue service avoided as appropriate. It is important that the cause-and-effect is appropriate to the fire strategy in terms of what is to be triggered on receipt of a fire signal at the fire panel in the first stage and what is to be triggered for a confirmed fire and how the second set of effects will be initiated.

8.48 This will confirm at an early stage if there is a fire or the cause of the false alarm. The arrangements should be included in the fire risk assessment, fire safety policy and emergency plan for the healthcare facility, and will be dependent on the healthcare facility, its occupancy and use. In addition to using information from the facility's users, modern technology provides a range of options for confirming the cause of an alarm. The best way to prevent false alarms from being transmitted as UwFS to the fire and rescue service is to stop them on-site.

Staged and staff alarms

8.49 It is normal for a fire detection and alarm system to initiate an evacuation on a fire signal. This is suitable for simple buildings where evacuating the occupants is a simple process and does not place them at risk. This is a single-phase evacuation.

8.50 In more complex buildings where people remote from an incident are unlikely to be placed at risk immediately, or where an evacuation process can place people at heightened risk, it is possible to introduce stages to the evacuation process. The initial warning and evacuation will be restricted to a limited area, usually co-located with fire-separating construction. It is also possible to restrict the initial alarm to key staff members so that they can assess the situation and manage an evacuation if it becomes necessary. In a hospital this will be because an evacuation can place patients at significant risk through the evacuation process. The risk of an unnecessary evacuation caused through a false alarm is not acceptable. This is also an important aspect of managing the response to UwFS and for maintaining business continuity.

8.51 This process will also enable evacuations to be managed more effectively. The purpose of the fire detection and alarm system is to support the evacuation procedure. Hospitals will normally be designed with a significant degree of fire-resisting construction. Where this has been adequately installed and maintained, this allows progressive horizontal evacuation to be carried out, where patients closest to a fire are evacuated horizontally to the next fire compartment or sub-compartment without the need for complex vertical evacuation in the initial stages of an incident. It is important that the fire alarm operating sequence reflects the fire compartmentation and sequence of evacuation in the emergency plan. This should detail the process and how the fire alarm will be used to signal a greater level of evacuation, should this be required.

8.52 To minimise disruption from false alarms, signals triggered by automatic fire detectors might be restricted initially to key members of staff, who investigate before any general evacuation signal is given and/or the fire and rescue service is summoned.

8.53 Staff alarms are normally generated only in response to signals from automatic smoke detectors, and not in response to signals from manual call points, heat detectors or sprinkler systems. However, in hospitals where an unnecessary evacuation is likely to place patients at increased risk or an evacuation in an associated area would have a similar effect, the use a staff alarm as the initial response to a signal from any device may be acceptable. This should be subject to special consideration and should be approved by the Authorising Engineer (Fire), and the fire and rescue service should be informed.

8.54 There should be adequate arrangements in place to ensure that there are always sufficient staff available to initiate evacuation in the immediate area and confirm if there is a fire situation. Such arrangements will necessitate a high level of training and awareness on the part of staff.

8.55 Staff alarms should always conform to the following recommendations:

- Staff alarms should be used only where staff, including any night staff, are sufficient in number and fully trained in the action they are to take in the event of fire.

- The vulnerability of the patients and potential complexities of evacuation could mean that a staff alarm should not incorporate any delay in summoning of the fire and rescue service when the fire alarm system operates. This should be discussed with the fire and rescue service. However, there may be a delay in the general alarm signal, provided all staff are made aware of the fire alarm signal.
- Staff alarms may respond to signals from manual call points, heat detectors or sprinkler systems where the risk of unnecessary evacuation poses a significant risk to patients. Any proposal to use a staff alarm as the initial response to a signal from a manual call point should be subject to the approval of the Authorising Engineer (Fire), and the fire and rescue service should be informed.
- In premises with a staff alarm system, there should always be provision, throughout all areas of the building, to indicate that a general alert is required. The extent of the general alert will depend on the staging of the evacuation sequence and emergency plan.
- Any staff alarm system should be supported by a system that automatically signals an actuation of the warning system in the affected zone if the incident is not resolved within a predetermined period. A staff alarm signal should automatically change to the general fire warning in at least the relevant alarm zone after a pre-set period, unless manual intervention to stop the associated timer occurs at the control equipment. The period for the staff to investigate should not normally exceed six minutes. However, this time may be extended following an assessment of the risks and fire protection measures in a particular area. Any time greater than six minutes should be approved by the Authorising Engineer (Fire) or the Fire Safety Committee, and the fire and rescue service informed. The system should be fail-safe and result in a general fire warning without indication that an investigation is underway.
- A staff alarm signal should automatically change to an audible fire warning in at least the relevant evacuation zone if a second device operates and the fire and rescue service summoned. Due to patient needs it may be appropriate to delay the general evacuation signal on the operation of a second device. This should be subject to the approval of the fire safety committee.

Seek and search

8.56 A seek and search system may be introduced for specific buildings; however, generally, it is preferable to have the same system in place site-wide. Seek and search in this context refers to a delayed call to the fire and rescue service. A robust protocol should be established and disseminated to all staff concerned, to ensure that the appropriate procedures are followed for each alarm signal generated.

8.57 On activation of an alarm, the fire response team should be sent to investigate the incident “seek and search” without compromising their safety. Those staff sent to investigate should be appropriately trained and have sufficient means of readily contacting the central point from which the incident is being controlled.

8.58 On arrival at the area where the alarm activation occurred, attending staff should communicate the status of the incident immediately to the central control point. This allows the fire and rescue service to be summoned at the earliest opportunity, or the alarm to be cancelled and a call to the fire and rescue service avoided as appropriate.

8.59 Where attending staff cannot be certain as to the status of the alarm, a call should be made to the fire and rescue service at the earliest opportunity.

8.60 If there are no signs of fire apparent but the fire alarm will not reset, and there is no obvious cause (such as a broken call point), the fire and rescue service should be called to assist in the investigation.

8.61 There should be a suitable timing device used to assess the "seek and search" time. This may form part of the fire alarm panel. The system should be fail-safe and result in a general fire warning without intervention.

8.62 There should be suitable communications between the fire investigation team and the switchboard or other person responsible for calling the fire and rescue service.

8.63 Seek and search teams are responsible for identifying if there are any signs of a fire, not the fire itself. These include sounds, smells and signs of smoke. They should always operate with a minimum of two people and should never put themselves at risk.

8.64 If the cause of the alarm is not identified within the pre-determined time, and the fire alarm reset, the fire and rescue service should be called.

8.65 Generally, the fire and rescue service would be summoned where an investigation by trained hospital staff has resulted in the discovery of a real-time fire incident requiring intervention from the fire and rescue service. However, the following situations should always result in the fire and rescue service being summoned:

- A telephone call from a member of staff on the designated emergency number (even if the fire alarm is not actuating) indicating that there are signs of fire (sight, sound, smell).
- More than one device (call point, fire detector, etc.) actuating on the fire alarm.
- Actuation of the fire alarm in an area where there are very high dependency patients.

Note:

BS 5839 distinguishes between coincidence detection and "double knock". It is a common occurrence for a signal from a single smoke detector to give rise to a false alarm. To provide greater resilience, BS 5839-1 allows for the use of coincidence detection. This is the arrangement designed so that an alarm output is given only when at least two independent input triggering signals are present at the same time. This is not to be mistaken for "double knock", which is a colloquial term often used for an arrangement whereby an output is given only when two successive signals are received from the same device. This means that the initial signal from one smoke detector is confirmed by the actuation of another device. This should not be confused with a pre-alarm warning of early warning of conditions which might (or might not) represent a fire but indicates an approaching alarm condition.

Information and training

8.66 The level or extent of the training required is not detailed in this HTM but should be the subject of a training needs analysis. Training should be completed by a competent person. Further information can be found in HTM 05-03 Part A.

8.67 All staff should be fully aware of how the fire detection and alarm system operates and how it supports the emergency plan. All staff will require informing that a "seek and search" system is being introduced, and if a fire occurs, they need to raise the alarm by activating a fire alarm call point and contacting the switchboard on the designated emergency number. All staff should be fully aware if a staff alarm or "seek and search" period is in operation.

8.68 The incident response team should be able to respond in the required time and have the skills and knowledge of the operating sequence of the fire detection and alarm system as defined in the emergency plan, i.e. any "seek and search" procedure in place, the use of staff alarms and how the fire detection and alarm system facilitates staging of the evacuation process. The incident response team should be capable of communicating with the person responsible for calling the fire and rescue service and managing the fire detection and alarm control panel. The team should have the required skills to establish the cause of any false alarm and the ability to use the fire detection and alarm system to prevent UwFS.

Roles and responsibilities

8.69 A framework for the management of fire safety is established in HTM 05-01. This HTM sets out specific responsibilities in respect of fire safety for those working in healthcare.

8.70 A healthcare organisation should set in place the policies necessary to aim to eliminate false alarms.

8.71 All staff within a healthcare organisation have a responsibility to strive to eliminate false alarms by controlling their environment, processes and actions to avoid unnecessary activation of the fire detection and alarm system.

8.72 The fire safety training curriculum that is developed should include instruction in the causes of false alarms, means of minimising their occurrence and actions to be taken to avoid unnecessary disruption. This should be included for all staff regardless of whether they are tasked with immediate response to investigate fire alarm activations or not. Further instruction should be provided in incident recording, reporting and remedial action.

8.73 The Fire Safety Manager has responsibility for all aspects of fire safety, including the monitoring and mitigation of false alarms. The Fire Safety Manager should coordinate sufficient site engineering resources to ensure availability throughout the hours of the unit's operation, with an on-call response at other times.

8.74 The healthcare organisation should have in place the necessary arrangements to ensure prompt attendance in the event of a fire alarm or reported fault. Information should be recorded in the fire detection and alarm system logbook following any actuation of the system and recorded in a manner which allows statistics on the incidence of false alarms to be analysed including any trends.

Investigation and review

8.75 The Fire Safety Manager/Authorised Person (Fire) or Authorised Person (Fire Safety Maintenance) should investigate the circumstances surrounding every false alarm incident to positively identify its cause and make a record using the common categories shown in "categories of false alarm". Details of false alarms should be presented to the board on a regular basis.

8.76 For the healthcare organisation to adequately address the issue, accurate records of all false alarms should be maintained. The healthcare organisation should set in place a mechanism to review the organisation's false alarm performance, and arrangements to mitigate such incidents and reduce these as far as possible.

8.77 The healthcare organisation should devise a strategy to reduce the number and frequency of false alarms and unwanted fire signals generated by the healthcare organisation. The strategy should be submitted to the healthcare organisation's Fire Safety Committee for action. Once a strategy has been agreed, the group should meet to monitor progress and review the false alarm performance improvements achieved. Details of false alarm performance and of any improvements made should be included in the

annual fire safety report to the board of the healthcare organisation.

8.78 In tackling the issue of false alarms, it is important to involve the appropriate stakeholders. These may include:

- Fire Safety Manager
- Authorised Person (Fire Safety Maintenance).
- Authorised Person (Fire)
- staff representative
- fire detection and alarm system maintainer
- fire detection and alarm system manufacturer
- consulting engineer specialising in healthcare fire safety
- fire and rescue service representative
- estates manager
- staff residences representative
- contractors (as appropriate).

8.79 This list is not exhaustive; other stakeholders may be required depending on the nature of the false alarms experienced and their causes. For example, it may be necessary to include the local authority pest control officer if several false alarms are attributable to insect infestations. It is not expected that all stakeholders will attend every meeting, as the attendance at each meeting should be tailored to the main reported causes of false alarms in the healthcare organisation.

8.80 Many fire and rescue services have personnel dedicated to the reduction of false alarms and unwanted fire signals. Close liaison with the fire and rescue service regarding false alarm performance and determining the appropriate measures to be taken to reduce their levels is essential to fostering joint understanding and avoiding undue burden to either party. The fire and rescue service are likely to have useful information gained from attending UwFS. They will also use attendance to understand how the facility's emergency plan operates and so inform their operation planning.

8.81 Liaison with the fire and rescue service will also review the organisation's performance, the main causes of false alarms and unwanted fire signals, and the steps necessary to reduce their occurrence. This will also reflect on the general fire safety management in place.

Minimising false alarms due to cooking activity

8.82 It is important to ensure that cooking activity is only ever carried out in designated areas in which appropriate automatic detection such as heat detectors, and appropriate ventilation measures, have been installed. The Building Engineering Services Association's (BESA) (2018) 'Specification DW/172 for kitchen ventilation systems' should also be referenced regarding fire alarm interfaces.

8.83 Detectors installed in areas adjacent to kitchens that may be subjected to cooking fumes from the kitchen should not be of the ionisation chamber type.

8.84 Doors to kitchen areas should not be wedged or otherwise held open, since this may permit cooking fumes to permeate beyond the kitchen and activate nearby automatic smoke detection. In addition, this practice may increase the fire risk to occupants and contravene fire safety legislation.

8.85 In circumstances where it is not desirable or practical to keep kitchen doors closed, alternative measures need to be considered. In residential kitchen areas or ward kitchens, these may include the provision of local mains-powered, self-contained smoke detectors in addition to the main detection system, located either in or immediately outside the kitchen. These self-contained detectors are intended to warn local occupants

of the presence of smoke prior to the main fire detection and alarm system being activated. This arrangement should be designed to allow nearby occupants to close kitchen doors and ventilate the kitchen to avert a false alarm being generated in the main system. Where such methods are employed, it will be necessary to provide staff training to highlight the distinction between the self-contained and main building alarms, and the actions to be taken in the event of either being activated.

8.86 In circumstances such as communal kitchens in staff residences, consideration may be given to devices that automatically turn on a kitchen extractor when any cooking appliances are used.

8.87 Where such devices are used, the kitchen extractor should continue to run for a pre-set time period after all the cooking appliances have been turned off.

8.88 The proliferation of automatic toasters in ward areas should be controlled. Organisations should set a policy regarding the type(s) of toaster to be permitted and their use. Toasters should only be used in designated areas with appropriate detection measures. Consideration should be given to wiring toasters directly to the mains supply via fused outlet connection to prevent them being moved to inappropriate locations. Alternatively, a non-standard mains plug should be fitted to the toaster, and associated power sockets should be provided only in designated areas.

8.89 Consideration should be given to specifying the use of conveyor-type toasters only, since these have been shown to reduce instances of burnt toast and resultant false alarms.

Minimising false alarms due to contractor activity

8.90 All tender and contract documents should identify the extent, nature and location of all automatic detection and manual call points located within the vicinity of the works area and any area that may be indirectly affected by the works.

8.91 The contract documents should make it the responsibility of the contractor to ensure that all their personnel are informed of the presence, nature and location of all relevant automatic detection and manual call points.

8.92 All contract documents should clearly identify the contractor as being responsible for taking all necessary precautions to avoid incidents of false alarm.

8.93 The activities of contractors should always be controlled in accordance with appropriate permit to work policies. The area and nature of work should be clearly defined and notified to the Fire Safety Manager, who will liaise with the responsible person to ensure the appropriate isolation of the fire detection and alarm system. This should be discussed and agreed on at pre-start meetings and updated as appropriate during the project.

8.94 A detailed schedule of work to be carried out should be prepared and submitted by the contractor prior to the commencement of works. This schedule should detail the precise measures the contractor proposes to reduce potential false alarms because of the works.

8.95 Particular attention should be paid to works that involve significant amounts of dust. Although isolation of the detection in the area of works will reduce the potential for false alarms whilst the work is being carried out, dust deposited in the detectors during works may cause false alarms when the detection and alarm system is brought back into service or at some point later. Detectors that may be subjected to dust from contractors' works should be covered and sealed from dust prior to the commencement of works, and a full check should be made on completion of works to ensure that all detectors have been uncovered prior to reinstatement of the detection system. It may be necessary to remove covers from automatic detection at the end of each working period to ensure

adequate fire detection outside the contractors' operating hours.

8.96 Contractor activity involving hot works should be subject to a detailed risk assessment including the likelihood of false alarms. A particular issue has been reported where hot works involving the welding of pipes and ducts have resulted in the transfer of smoke along the pipe or duct to areas remote from the works. A hot works permit system should be employed covering all hot works.

8.97 Care should be taken to ensure that smoke from hot working is appropriately extracted to avoid false alarms. As extracting smoke from hot working may prevent the products of combustion from an associated fire being discovered quickly, consideration should be given to additional safeguards that may be necessary. Appropriate automatic fire detector covers should be used where appropriate to reduce the reliance of staff having to make ad-hoc arrangements such as the use of gaffer tape, gloves, plastic bags, etc.

8.98 Management controls should be put in place to review a contractor's performance in terms of false alarm generation. Consideration may be given to introducing penalty clauses into works contracts regarding unnecessary alarm actuations by contractors as a result of their activities. A contractor's record of causing false alarms should be considered before placing further work with that contractor.

Minimising false alarms due to electrical influences

8.99 Instances of electrical influences causing false alarms are particularly difficult to identify unless system wiring faults or coincidental effects in other electrical systems are observed.

8.100 System wiring faults giving rise to false alarms are relatively small, since modern fire detection and alarm systems should discriminate between faults and fire signals from detection devices. However, some instances do occur, and fire detection and alarm system cabling should be properly installed, protected against mechanical damage where necessary, and readily identifiable to minimise damage and inappropriate modification.

8.101 Electrical causes of false alarms are largely due to electromagnetic interference affecting either the alarm and detection system field wiring or power supplies, or the system devices themselves.

8.102 Reference should be made to the guidance regarding potential interference in BS 5839-1.

8.103 Radio-based detection and alarm systems should be compliant with the Radio Equipment and Telecommunication Terminal Equipment Regulations 2000 (as amended) and Radio Equipment Regulations 2017. (The Radio Equipment and Telecommunications Terminal Equipment Regulations 2000 were revoked on 26 December 2017 but continue to apply to relevant products placed on the market prior to this date.)

8.104 All system cabling should be installed using appropriately specified cables and installation practices in accordance with BS 5839-1, BS 7671 and HTM 06-01. Power supplies should be dedicated to the fire detection and alarm system in accordance with BS 5839-1.

8.105 When designing the fire detection and alarm system, detailed consideration should be given to the potential sources of electromagnetic interference, likely field strengths and frequencies. The system designer should carefully consider the effects of interference on the devices proposed and should ensure that selected equipment is appropriate for use and will not result in false alarms. The system designer should take due regard of the system manufacturers' instructions and guidance to reduce electromagnetic interference.

Minimising false alarms due to steam

8.106 Most steam-related false alarms occur in boiler houses and plantrooms where steam is generated, used and distributed. Steam vents should always vent directly to the outside and in any case should not vent in the direct vicinity of smoke or heat detection. Further guidance is available from the Safety Assessment Federation's (SAFED) (2019) 'Guidance on the safe operation of steam boilers'.

8.107 Care should be taken to ensure that provisions for steam extraction are made wherever steam is used or produced and there is a possibility of water vapour escape.

8.108 The appropriate detection method should be used, and detectors should be appropriately sited in relation to steam production equipment or equipment which uses steam such as water heaters and autoclaves.

8.109 With regard to the number of false alarms caused by steam from kettles in areas such as offices, it is necessary to ensure that beverage facilities are located away from smoke detection. Where false alarms have occurred, beverage facilities should be relocated in specific areas designed for such purpose and with appropriate detection.

Minimising false alarms due to smoking

8.110 Restriction of smoking by patients, visitors and staff can lead to illicit smoking. Often this occurs in areas where automatic detection is installed, and this leads to false alarms being generated. Where such behaviour occurs, it should be controlled in accordance with local management procedures.

Minimising false alarms due to patients or members of the public

8.111 Instances of patient-activated false alarms occur predominantly in mental health wards. The majority of these are reported to be attempts by patients to gain attention or, where electronic door locks are linked to the alarm system, to abscond.

8.112 The provision of automatic detection should not be reduced in order to minimise false alarms, since such action is likely to detract from the overall level of patient safety, particularly in the case of mental health service users, who may present an increased fire risk through inadvertent or deliberate fire-setting.

8.113 The level of staff supervision in mental health units will minimise instances of patients interfering with the automatic detection. Activation of break-glass manual call points is more difficult to control, since the movements needed to activate a call point are less visible and hence more difficult for staff to prevent.

8.114 Where activation of call points by patients gives rise to false alarms, consideration should be given to providing measures such as lift flaps that prevent call point activation unless the flap is lifted. Further measures may utilise devices that activate a localised audible warning when a flap is lifted prior to call point activation. If such measures prove insufficient, a risk assessment should be undertaken to determine the impact of changing vulnerable break-glass call points to key-operated units that can be activated only by staff keyholders (see paragraph 8.39).

8.115 In many instances, false alarms have been generated because of confusion regarding the release of electronic security devices. Doors secured by electronic locking mechanisms are usually provided with a push-button to permit exit from the department or area and with an emergency override break-glass in accordance with BS 7273-4.

Since department exits usually coincide with the fire alarm zone boundaries, it is established practice to provide manual call points at these locations.

8.116 The number of such controls in a single location has been reported to have given rise to confusion on the part of those seeking to exit the department or area and has resulted in the inadvertent activation of the fire alarm manual call point in an attempt to release the electronic locking mechanism. Consideration should be given to locating the various controls in such a way as to reduce the potential for inadvertent activation of the manual call point.

8.117 Clearly visible signs should be provided to readily identify the location of push-button controls for everyday use and to clearly distinguish the fire detection and alarm system manual call point.

9 Operational responsibilities

Competence

9.1 The lack of a coherent and comprehensive approach to competence can seriously compromise the fire safety design. For example, if decisions about system design and/or components are made by people who do not fully understand the implications of how to produce an effective fire detection and alarm system, this can lead to a system that is not appropriate for the risk. This can also result in systems that are difficult for staff to operate and maintain.

9.2 It is important that those in technical leadership positions ensure that organisations and individuals involved in fire alarm design installation and maintenance are competent in their role. This also means that the professionals involved in this work continue to maintain their competence in the spirit of continuous development.

9.3 A competent person must be able to demonstrate that they have the required combination of training, skills, experience and knowledge to perform their role. Individuals will belong to differing professional bodies and will be registered at differing levels.

9.4 This also applies to organisations employed to work on fire alarm systems. Third-party certification schemes for fire protection products and related services are an effective means of providing assurances of quality, reliability and safety. Healthcare organisations should select products and services with third-party accreditation. Preference should therefore be given to systems, installers, designers and maintainers who have been independently assessed by a UKAS third-party accredited body such as the British Approvals for Fire Equipment (BAFE) and/or the Loss Prevention Certification Board's (LPCB) Loss Prevention Standards (LPS).

Design process

9.5 It is important that the design process of a fire detection and alarm system takes into account the requirements as set out by the client. This should be based on the needs highlighted in the fire strategy and/or the fire risk assessment. They may also include business continuity requirements as well as client concerns regarding detailed design requirements.

9.6 As with any fire safety design, this will require an effective link between the client brief, design, fire strategy and or fire/risk assessment and ultimately whether the actual operational approach meets with the client's intentions. This will require liaison with other professionals working on the built environment that has either a direct or indirect impact on the fire alarm system.

9.7 For larger projects it is likely that the industry design process would be followed with work stages that reflect the application of a typical construction project, such as those set out by the Royal Institute of British Architects' (RIBA) 'Plan of work'. This describes the work stages for construction projects from business case and strategic brief

through to handover into occupation and use. Each stage has set boundaries, and the RIBA 'Plan of work' details the tasks and outputs required at that stage. BS 9999 sets this process out in terms of fire safety design. Fire detection and alarm are a crucial part of this process. By following these principles, the interaction between client, designer and installer should ensure that an appropriate fire alarm is installed. It also should highlight the interdependencies within a project, particularly between the different aspects of fire safety design and operational management.

9.8 For smaller projects, this process may not be applicable, but the principles set will help any fire alarm project.

Roles and responsibilities

9.9 The following roles will have some responsibility for the specification, design, installation and maintenance of the fire detection and alarm system.

9.10 As mentioned in paragraph 6.6, the responsible person should nominate a single, named member of the premises management who should be appointed to supervise all matters pertaining to the fire detection and alarm system as specified in BS 5839-1.

Authorised Person (Fire Safety Maintenance)

9.11 The Authorised Person (Fire Safety Maintenance) is detailed in paragraphs 7.2–7.4.

Authorised Person (Fire) [Fire Safety Adviser]

9.12 The Authorised Person (Fire) reports to the Fire Safety Manager for matters of fire safety. They provide competent fire safety advice and will be responsible for providing expert technical advice on the application and interpretation of fire safety guidance, including Firecode, and the assessment of fire risks within premises owned, occupied or under the control of the healthcare organisation. The Authorised Person (Fire) should provide advice on how the fire detection and alarm system fits within the general fire safety management regime in the hospital. They are a key player in assisting and ensuring that the prevention and emergency action plan is in place for all departments. They should seek additional advice from other experts across the organisation when required.

9.13 The Authorised Person (Fire) will be able to provide the wider information of the assessment of risk from fire and either the proposed or existing fire protection measures in place. They will be a crucial member of any design team for a fire alarm system and should be consulted about any significant changes proposed to an existing system.

Authorising Engineer (Fire) [External Specialist]

9.14 The Authorising Engineer (Fire) will act as an independent professional adviser to the healthcare organisation. A healthcare organisation is not required to directly employ an Authorising Engineer (Fire). Indeed, to effectively carry out this role, particularly with regard to audit, it is preferable that the Authorising Engineer (Fire) remains independent of the operational structure of the healthcare organisation. However, where the design of the fire detection and alarm system is complex or involves any significant departure from this document, the advice of an Authorising Engineer (Fire) [External Specialist] should be sought.

Competent Person (Fire)

9.15 Installers and maintainers of fire safety equipment will be commissioned by the healthcare organisation and must be able to demonstrate a sound knowledge and specific skills in the specialist service being provided. This may include the installation and/or maintenance of related fire safety equipment/ services such as the fire detection and alarm

system, and associated equipment such as fire suppression systems, fire dampers, etc. As noted above, third-party certification schemes for fire protection products and related services are an effective means of providing assurances of quality, reliability and safety.

Electrical Safety Group

9.16 As electrical systems, there is likely to be an overlap in responsibility for fire alarm systems involving the integration of a fire detection and alarm system. The governance and design principles set out in the HTM 06 series should be followed. This includes general electrical safety, specific fire safety system advice and guidance that relates to the installation of electrical systems.

9.17 In a healthcare organisation, the Electrical Safety Group is responsible for ensuring that all electrical safety issues are monitored, recorded and acted on in line with the relevant legislation and guidance. The Electrical Safety Group, through engagement with designers, should oversee the maintenance and operation of the system by monitoring, recording and acting on all electrical safety issues in accordance with the appropriate legislation and guidance. It is important that there is close liaison with the Authorised Person (Fire).

Fire Safety Committee

9.18 The fire safety committee is detailed in HTM 05-01. It should be responsible for the review of all fire safety matters.

10 Facilities providing mental health services and services for people with learning disabilities

10.1 Patient care provided for people with mental health conditions and accommodation for people with learning disabilities is likely to require a differing approach to standard fire detection and alarm design. Accommodation can consist of in-patient care with acute in-patient ward, psychiatric intensive care units, forensic services and units providing secure services. Other services can include recovery and rehabilitation services, dementia assessment units and facilities for people with learning disabilities.

10.2 Although the range of services provided varies considerably, there are common matters that should be considered to enable appropriate levels of fire safety to be achieved. The aim is to provide a safe and secure environment where patients can receive care and treatment. However, safety from the effects of fire and maintaining the required levels of security are equally important, and the design of fire precautions and evacuation strategies should not compromise security.

10.3 Highly trained specialised nursing and clinical staff are always present when the premises are occupied, and they will be trained to take the lead role in the evacuation of patients.

10.4 Due to the unique environment in mental health, specific consideration will be needed for the design and operation of fire detection and alarm systems. This will help reduce the level of false alarms and provide an appropriate operational response to any fire situation. At the early design stage, a QDR should be undertaken (see paragraphs 8.27 and 8.28). This should include the designer, the user(s), the Authorised Person (Fire), Authorised Person (Fire Safety Maintenance), the installer/manufacturer, staff representative (including those with an understanding of the specific patient needs), facilities managers (both hard and soft FM) and the maintainers.

10.5 The design of the fire detection and alarm system should reflect these aspects. This should include consideration of the following:

- The emergency plan is likely to be staff-led. It is not always appropriate to provide an audible alarm signal. In these situations, the use of staff alarms with appropriate levels of staffing may be appropriate.
- Integration of the alarm and detection system with staff and patient monitoring and location systems can improve response times to alarm situations.
- Full use of seek-and-search periods and staged evacuation is likely to be valuable in providing staff time to assess a fire situation and decide on the appropriate intervention.

- For security purposes, final exits may not be released immediately on actuation of the alarm. The release mechanism should form part of the overall strategy for managing the evacuation. This gives control to the staff and increases the security of the facility. Some means of control should be provided such that these doors can be opened by staff on confirmation of the fire signal, when it becomes necessary to evacuate to a designated (secure) assembly point. This will need to be considered in both the design and commissioning process and in producing the emergency plan. The cause-and-effect will need to be considered in the interface with the security system.
- Audible alarm devices should normally be provided in all areas of the premises. It may be appropriate to use an alarm signal of a lower level. There should be careful siting of alarm devices to warn staff without undue disturbance to patients. To achieve this, the audibility of the general alarm in areas where patients require assistance to evacuate need only be typically in the range 45-55 dB(A), or 5 dB(A) above the notional noise level, whichever is greater. As far as possible, sound pressure levels greater than this should be avoided. It is preferable that a large number of quieter sounders, rather than a few very loud sounders, be used to prevent noise levels in some areas becoming too loud.
- To prevent noise levels becoming too loud, it may only be the staff that are required to be alerted. Visual alarm devices may be provided as an alternative to alarm sounders in areas where an audible alarm is unacceptable as they are only required to alert staff. This should be subject to a full assessment of the service user's needs, risk control measures and staff available to respond to an incident. The use of specific visual alarm devices should be carefully assessed. Many service users in mental health facilities exhibit photosensitivity; hence, the inappropriate use of flashing beacons may lead to an adverse reaction.
- Visual alarm devices should be sufficient in number and distributed to be visible from all normally accessible locations throughout the area in which they are provided, under normal ambient lighting levels. They should not normally be mounted below 2.1 m.

11 Categories of false alarm

11.1 The "CLASS" categories shown in the table below should be used to identify the cause of the fire alarm activation. The completed briefing (see Chapter 13) should be submitted to the Fire Safety Manager for recording and further action.

	CLASS	TASK FORCE DEFINITION	EXAMPLES
1.	Malicious	Incident in which the fire alarm system has been activated as the result of the actions of a person who is aware that there is no fire	Operation of a manual call point or tampering with an automatic detector with the intention of raising a fire alarm signal, knowing that there is no fire
2.	Good intent	Incident in which the fire alarm system has been activated by a person in the belief that there is a fire, when no fire exists	Operation of a manual call point or an evacuation control at the control panel, in the erroneous belief that there is a fire
3.	Accidental damage	Incident in which the fire alarm system has been activated because of accidental mechanical damage	Accidental mechanical damage to an automatic detector, manual call point, extinguishing system component, wiring or control equipment; ingress of water to equipment
4.	Alarm activated by patient or public	Incident in which the fire alarm system has been activated because of the actions of a person who is not a member of staff when there is no fire	Fire alarm break glass point or detector activated where the person has not intended to act maliciously
5.	Environmental effect: cooking fumes	Incident in which the system has responded to a fire-like phenomenon or environmental influence (Other than those in 6 to 8)	Unwanted alarm because of detection of cooking
6.	Environmental effect: smoking	Incident in which the system has responded to a fire-like phenomenon or environmental influence (Other than those in 5, 7 and 8)	Unwanted alarm because of detection of smoke from smoking material
7.	Environmental effect: insects	Incident in which the system has responded to a fire-like phenomenon or environmental influence (Other than those in 5, 6 and 8)	Unwanted alarm because of detection of insects
8.	Environmental effect: other	Incident in which the system has responded to a fire-like phenomenon or environmental influence (Other than those in 5 to 7)	Unwanted alarm because of detection of environmental influences, other than those included in 5 to 7. This would include a fire outside the building, such as controlled burning which has activated a smoke detector or excessive dust.

	CLASS	TASK FORCE DEFINITION	EXAMPLES
9.	System fault/design	Incident in which the system has produced a fire alarm signal because of an identifiable, diagnosed fault	Circuit fault Faulty detector Unsuitable equipment or positioning
10.	System procedures not complied with	Incident which resulted in inappropriate response to incorrect action by a person (Other than malicious action or accidental damage to the system and/or those in 7)	Test of system without prior notification of an alarm-receiving centre Not closing off detectors when undertaking construction, etc. Not using permit-to-work, e.g. hot working under detection
11.	Management procedures not complied with/ building not used correctly	Incident which resulted in inappropriate response to incorrect action by a person (Other than those in 6)	Incorrect building management such as leaving fire doors to kitchens wedged open, actuating adjacent smoke detectors
12.	Bomb alerts	Incident which resulted in inappropriate response to the fire alarm being activated to evacuate persons from the premises in the case of a bomb warning or hoax	Fire alarm activated by building manager following receipt of a bomb alert to evacuate the building quickly. The fire alarm should not be used for this purpose. The attendance at the building of the fire and rescue service would put firefighters unnecessarily at risk
13.	Sprinkler alarm – water pressure	Alarm signal arising from fluctuation of pressure within the sprinkler installation	Increase in pressure of a town's main, pressure surge on start of sprinkler pumps, or loss of pressure in system
14.	Sprinkler alarm – other known causes	Alarm signal arising from a sprinkler installation for a known reason other than damage or water pressure variation	There will be very few such incidents
15.	Unknown	Alarm signal arising from a source that cannot be reliably identified	Unwanted alarm because of detection for reasons others than those included above

12 Premises and area types

12.1 Details of the location types and codes as shown in the table below should be entered on the briefing note (see Chapter 13).

Table 1 – Premises types

List 1 Site		List 2 Affected parts	
1	Hospital/Clinic	1	Factory
2	Sheltered Housing	2	Office
3	Health/Residential Care	3	Shop
4	Hotel/Boarding Houses	4	Residential Staff
5	Industrial	5	Residential Public
6	Commercial	6	Residential Patient
7	Recreational	7	Sports
8	Educational	8	Entertainment (incl. liquor, cinema, theatre etc)
9	Dispersed Housing	9	Clinical area
10	HIMO (houses in multiple occupation)	10	Communal areas
11	Dwelling	11	Storage area
12	Prison/Police/Fire/Ambulance premises	12	Teaching area
13	Airport	13	Food preparation area
14	Crown/Diplomatic Immunity	14	Concealed areas (voids etc)
15	Defence Establishments	15	Other Healthcare Area
16	Emergency services		

Table 2 – Area types			
Patient-accessed areas		Non-patient-accessed areas	
P1	General Medical Ward	S1	Catering
P2	General Surgical Ward	S2	Boilerhouse
P3	Mental Health Ward	S3	Plantroom
P4	Orthopaedic Ward	S4	Administration
P5	Paediatric Medical Ward	S5	Residences
P6	Paediatric Surgical Ward	S6	Laundry
P7	Paediatric Intensive Care	S7	Estates Department
P8	Intensive/Critical Care	S8	Medical Records
P9	Out-patient Department	S9	Occupational Health
P10	Accident & Emergency	S10	Main Stores
P11	Other Ward	S11	Mortuary
P12	Radiology	S12	Switchboard
P13	Pathology	S13	HSDU (hospital sterilizing and disinfecting unit) or central sterile services department
P14	Pharmacy	S14	IT Department
P15	Operating theatre	S15	Education
P16	Retail area	S16	Residence
P17	Restaurant	S17	Garage

Table 3 – Rooms			
R1	Single bedroom	R20	Utility room
R2	Multi-bed room	R21	Disposal room
R3	Dayroom	R22	Linen room
R4	Bathroom	R23	Staff room
R5	Consulting/examination room	R24	Classroom
R6	Treatment room	R25	Electrical cupboard
R7	Waiting room/area	R26	Joiners' workshop
R8	Computer room	R27	Plumbers' workshop
R9	Sewing room	R28	Engineers' workshop
R10	Gymnasium	R29	EBME (electro-biomedical engineering) workshop
R11	Hydrotherapy pool	R30	Calorifier room
R12	Library	R31	Lift plantroom
R13	Corridor/circulation area	R32	Duct
R14	Dining area	R33	Ceiling void
R15	Local kitchen	R34	Roof space
R16	Catering department kitchen	R35	Service void
R17	Servery	R36	Laboratory
R18	Office	R37	Bedroom (residence)
R19	Storeroom	R38	Other (state)

13 Incident briefing information

13.1 All relevant details of false alarm activations should be collated into a briefing note (see next page). It is important that as much detail as possible is provided. The completed briefing should be submitted to the Fire Safety Manager for recording and further action.

Fire Alarm Incident Briefing Note

Time	Date

Location of Alarm

Location Of alarm signal (select codes from Chapter 12)	Table 1 List 1		Table 1 List 2		Table 2		Table 3	
Fire Service Attendance	Yes		No		Fire response team Attendance	Yes		No
Fire Service Classification								

Fire Detection System Information									
Panel Indication	Fire	Fault	Pre Alarm	Warning	Disabled	Power	Zone Number	Other (Specify)	Other (Specify)

Category of Unwanted Fire Signal (select class from Chapter 11)	

Panel Display Text (Enter text as displayed on the system panel and append printout if available

Is the indicator visible on the indicating detector	Yes		No	

Description Of Events

Completed by	Contact Info	Position

Forward to Fire Safety Co-ordinator

14 Fire incident report

14.1 The Fire Safety Manager should complete all the details of the fire alarm activation report.

Tick appropriate box ☐ **Fire** ☐ **False alarm**

1. Hospital/site _____
2. Trust/organisation _____
3. Age of building _____
4. Date of incident _____
5. Time of incident _____
6. Time of call to fire service: _____
7. Time fire service arrived: _____
8. Duration of incident: _____
9. Estimated cost of damage/disruption: _____

10. Incident response:

Fire service attendance ☐ YES ☐ NO — No. of appliances initially attended: ☐ Total no. of appliances attended: ☐

Fire response team attendance ☐ YES ☐ NO — Number in team: ☐ Duration of involvement: ☐

11. Location details:

Location of alarm (*select codes from Chapter 12*)

Table 1 List 1 ☐ Table 1 List 2 ☐ Table 2 ☐ Table 3 ☐

Fire Incident Details Answer questions 12 to 19 by ticking one or more of the options provided

12. Fire discovered by: (*to be completed for fire incident*)

☐ Employee ☐ Visitor/passer-by ☐ Smoke detector ☐ Other (please specify)
☐ Patient ☐ Sprinkler ☐ Heat detector

13. Method of extinguishment: (*to be completed for fire incident*)

☐ None ☐ Fire hose ☐ Smothering ☐ CO_2, inert gas etc
☐ Self-extinguished ☐ Dousing with water ☐ Removal ☐ Fire service
☐ Portable extinguisher ☐ Equipment isolated ☐ Sprinkler ☐ Other (please specify)

14. Material first ignited: (*to be completed for fire incident*)

☐ Raw materials ☐ Bedding, mattress ☐ Fittings ☐ Decoration, soft toys
☐ Vegetation ☐ Upholstery ☐ Food ☐ Cleaning materials
☐ Clothing on person ☐ Other furnishings ☐ Electrical insulation ☐ Waste
☐ Other textiles ☐ Structure ☐ Lagging ☐ Unknown
☐ Other (please specify)

15. Spread of fire within room of origin: (*to be completed for fire incident*)

☐ Not applicable ☐ Stored material ☐ Furnishings - linings ☐ Other (please specify)
☐ Confined to item ☐ Furnishings - fittings ☐ Equipment

16. Cause of fire: (*to be completed for fire incident*)

☐ Deliberate ☐ Water heating ☐ Equipment failure (elec) ☐ Smoking
☐ Cooking appliances ☐ Hot work ☐ Equipment failure (mech) ☐ Unknown
☐ Space heating ☐ Lighting ☐ Wire & cable (fixed) ☐ Other (please specify)
☐ Central heating ☐ Naked lights ☐ Wire & cable (leads)

17. Spread of smoke beyond room of origin: (*to be completed for fire incident*)

☐ Not applicable ☐ Adjacent room(s) ☐ Stairway(s) ☐ Adjacent buildings
☐ Confined to room ☐ Street/main corridor ☐ Other floor(s) ☐ Other (please specify)
☐ Corridor(s) ☐ Adjacent department(s) ☐ Roof void(s)

18. Spread of burning beyond room of origin: (*to be completed for fire incident*)

☐ Not applicable ☐ Adjacent room(s) ☐ Stairway(s) ☐ Adjacent buildings
☐ Confined to room ☐ Street/main corridor ☐ Other floor(s) ☐ Other (please specify)
☐ Corridor(s) ☐ Adjacent department(s) ☐ Roof void(s)

19. Route of fire spread: (*to be completed for fire incident*)

☐ Not applicable ☐ Spaces/voids ☐ Open fire doors ☐ External
☐ Ducts ☐ Defective fire-stopping ☐ Stairways/lifts ☐ Other (please specify)

Effects on persons involved

20. Extent of evacuation:

☐ Unnecessary	☐ Department	☐ Floor	☐ Adjacent building(s)
☐ Room only	☐ Street/main corridor	☐ Other floor(s)	☐ Other (please specify)
☐ Adjacent room(s)	☐ Adjacent department(s)	☐ Whole building	

Answer the following by indicating numbers of persons involved; boxes should be left blank if the answer is "none".

21. Number of people in room of origin:	Patients		Staff		Visitors	
22. Number of people evacuated from room:	Patients		Staff		Visitors	
23. Number of people evacuated from apartment:	Patients		Staff		Visitors	
24. Number of people evacuated from floor/building:	Patients		Staff		Visitors	

25. Injuries to persons	**Patients**			**Staff**		**Visitors**	
	Killed	**Injured**	**Condition aggravated**	**Killed**	**Injured**	**Killed**	**Injured**
Burns							
Smoke inhalation							
Evacuation							

"Near miss" information

The following set of information considers the possible implications had the fire spread further. Answer the following by ticking one or more of the options provided.

26. Area to be next affected: *(to be completed for fire incident)*

☐ Not applicable	☐ Out-patients	☐ Boilerhouse	☐ Laundry
☐ Mental health ward	☐ A&E	☐ Street/main corridor	☐ Estates department
☐ Elderly ward	☐ X-ray	☐ Lab/pharmacy	☐ Adjacent building
☐ ITU/SCBU	☐ Main kitchen	☐ Admin/offices	☐ Other (please specify)
☐ Other ward	☐ Main plantroom	☐ Main stores	
☐ Operating department	☐ Medical records	☐ Education	

27. Estimate of time that would elapse before the next area was evacuated:

28. Estimate of how long it would take to evacuate the next area:

29. Additional comments include sequence of events and a brief description of the building construction (where relevant). Provide sketches if necessary and use additional sheets if required.

Return to:

Completed by

Name: **Position:**

Signature: **Date:**

References

Note:

The publication dates provided in the references list below correspond to when this edition of HTM 05-03 Part B was drafted. The dates give context on the currency of referenced sources at the time of writing.

Standards and other specification documents are continually being updated, and readers should ensure they consult the latest editions of such documents, including any amendments issued after publication, to ensure they remain up to date with and can react to changing requirements.

Acts and Regulations

Building Regulations 2010. Approved Document B. Volume 2: Buildings other than dwelling houses.
https://www.gov.uk/government/publications/fire-safety-approved-document-b

Building Safety Act 2022.
https://www.legislation.gov.uk/ukpga/2022/30/contents/enacted

Construction (Design and Management) Regulations 2015. SI 2015 No. 51.
https://www.legislation.gov.uk/uksi/2015/51/contents/made

Electromagnetic Compatibility Regulations 2005. SI 2005 No. 281.
https://www.legislation.gov.uk/uksi/2005/281/contents

Higher-Risk Buildings (Descriptions and Supplementary Provisions) Regulations 2023.
https://www.legislation.gov.uk/ukdsi/2023/9780348242812/contents

Localism Act 2011.
https://www.legislation.gov.uk/ukpga/2011/20/contents/enacted

Radio Equipment and Telecommunications Terminal Equipment (Amendment) Regulations. SI 2003 No. 3144.
https://www.legislation.gov.uk/uksi/2003/3144/contents/made

Radio Equipment Regulations 2017. SI 2017 No. 1206.
https://www.legislation.gov.uk/uksi/2017/1206/contents/made

Regulatory Reform (Fire Safety) Order 2005. SI 2005 No. 1541.
https://www.legislation.gov.uk/uksi/2005/1541/contents/made

British Standards

BS 5839. Fire detection and alarm systems for buildings:

Part 1: 2017 - Fire detection and fire alarm systems for buildings. Code of practice for design, installation, commissioning, and maintenance of systems in non-domestic premises.

Part 3: 1988 - Specification for automatic release mechanisms for certain fire protection

equipment.

Part 6: 2019 - Code of practice for the design and installation of fire detection and alarm systems in dwellings.

Part 8: 2013 - Code of practice for the design, installation and servicing of voice alarm systems associated with fire detection systems.

Part 9: 2021 - Fire detection and fire alarm systems for buildings - Code of practice for the design, installation, commissioning and maintenance of emergency voice communication systems.

BS 6173:2020. Installation and maintenance of gas fired catering appliances for use in all types of catering establishments (2nd and 3rd family gases). Specification.

BS 6266:2011. Fire protection for electronic equipment installations. Code of practice.

BS 7273-1:2006. Code of practice for the operation of fire protection measures. Electrical actuation of gaseous total flooding extinguishing systems.

BS 7273-4: 2015+A1: 2021. Code of practice for the operation of fire protection measures - Actuation of release mechanisms for doors.

BS 7273-6: 2019. Code of practice for the operation of fire protection measures. Fire detection and fire alarm systems. Interface with ancillary systems and equipment.

BS 7629-1:2015+A1:2019. Electric cables. Specification for 300/500 V fire resistant, screened, fixed installation cables having low emission of smoke and corrosive gases when affected by fire - Multicore cables.

BS 7671: 2018+A2:2022. Requirements for electrical installations. IEE Wiring Regulations. Eighteenth Edition.

BS 8519:2020. Selection and installation of fire-resistant power and control cable systems for life safety, fire-fighting and other critical applications. Code of practice.

BS 8591:2014. Remote centres receiving signals from alarm systems. Code of practice.

BS 9518:2021. Processing of alarm signals by an alarm receiving centre. Code of practice.

BS 9999:2017. Fire safety in the design, management and use of buildings. Code of practice.

BS EN 54-2:2006. Control and indicating equipment.

BS EN 54-23:2010. Fire alarm devices. Visual alarm devices.

BS EN 54-25:2008. Components using radio links.

BS EN 50518:2019. Monitoring and alarm receiving centre.

BS EN ISO 9001. Quality management and quality assurance standards.

PD 156865:2008. Standardized method of life cycle costing for construction procurement: a supplement to BS ISO 15686-5 Buildings and constructed assets. Service life planning - Part 5: Life cycle costing.

NHS England publications

Health Building Note 26. Facilities for surgical procedures. 2004. (Soon to be superseded by HBN 10-01.)
https://www.england.nhs.uk/wp-content/uploads/2021/05/HBN_26.pdf

Health Technical Memorandum 03-01. Specialised ventilation for healthcare premises. 2020.
https://www.england.nhs.uk/publication/specialised-ventilation-for-healthcare-buildings/

Health Technical Memorandum 05-01. Managing healthcare fire safety. 2013. https://www.england.nhs.uk/publication/managing-healthcare-fire-safety-htm-05-01/

Health Technical Memorandum 05-02. Guidance in support of functional provisions (fire safety in the design of healthcare premises). 2015. https://www.england.nhs.uk/publication/fire-safety-in-the-design-of-healthcare-premises-htm-05-02/

Health Technical Memorandum 05-03 Part K. Guidance on fire risk assessments in complex healthcare premises. https://www.england.nhs.uk/publication/fire-safety-in-the-nhs-health-technical-memorandum-05-03/

Health Technical Memorandum 06-01. Electrical services distribution and supply. 2017. https://www.england.nhs.uk/publication/electrical-services-supply-and-distribution-htm-06-01/

Health Technical Memorandum 06-02. Electrical safety guidance for low voltage systems. 2022. https://www.england.nhs.uk/publication/electrical-safety-guidance-for-low-voltage-systems-htm-06-02/

Miscellaneous references

BAFE Fire Safety Register (2023). **BAFE SP203-1. Fire Detection and Fire Alarm Systems. Design, Installation, Commissioning and Maintenance of Fire Detection and Fire Alarm Systems Scheme.** https://www.bafe.org.uk/become-bafe-registered/bafe-sp203-1-assessment-and-registration-process

BSRIA (2020). **Guide BG 79/2020: Handover information and O and M manuals. Version A (includes amendment dated 7 April 2021).** ISBN 9780860227793, BSRIA, Bracknell.

Building Engineering Services Association (BESA) (2018). **Ductwork Specification DW/172 Specification for kitchen ventilation systems**. 2nd edition (incorporates addendum April 2020).

CIBSE (2006). **Technical Memoranda TM 31: Building log book toolkit**. ISBN 9781903287712, CIBSE, London.

Loss Prevention Certification Board (LPCB) (2023). **Requirements for certificated fire detection and alarm system firms (LPS 1014)**. BRE Certification Ltd. Watford.

Royal Institute of British Architects (RIBA) (2020). **RIBA Plan of Work. Overview**. **Royal Institute of British Architects, London.** https://www.architecture.com/knowledge-and-resources/resources-landing-page/riba-plan-of-work

Safety Assessment Federation (SAFED) (2019). **Guidelines BG01: Guidance on safe operation of steam boilers. Edition 2.** SAFED, London.

NHS England
Wellington House
133–155 Waterloo Road
London
SE1 8UG

Publications approval reference: PRN00619_ii