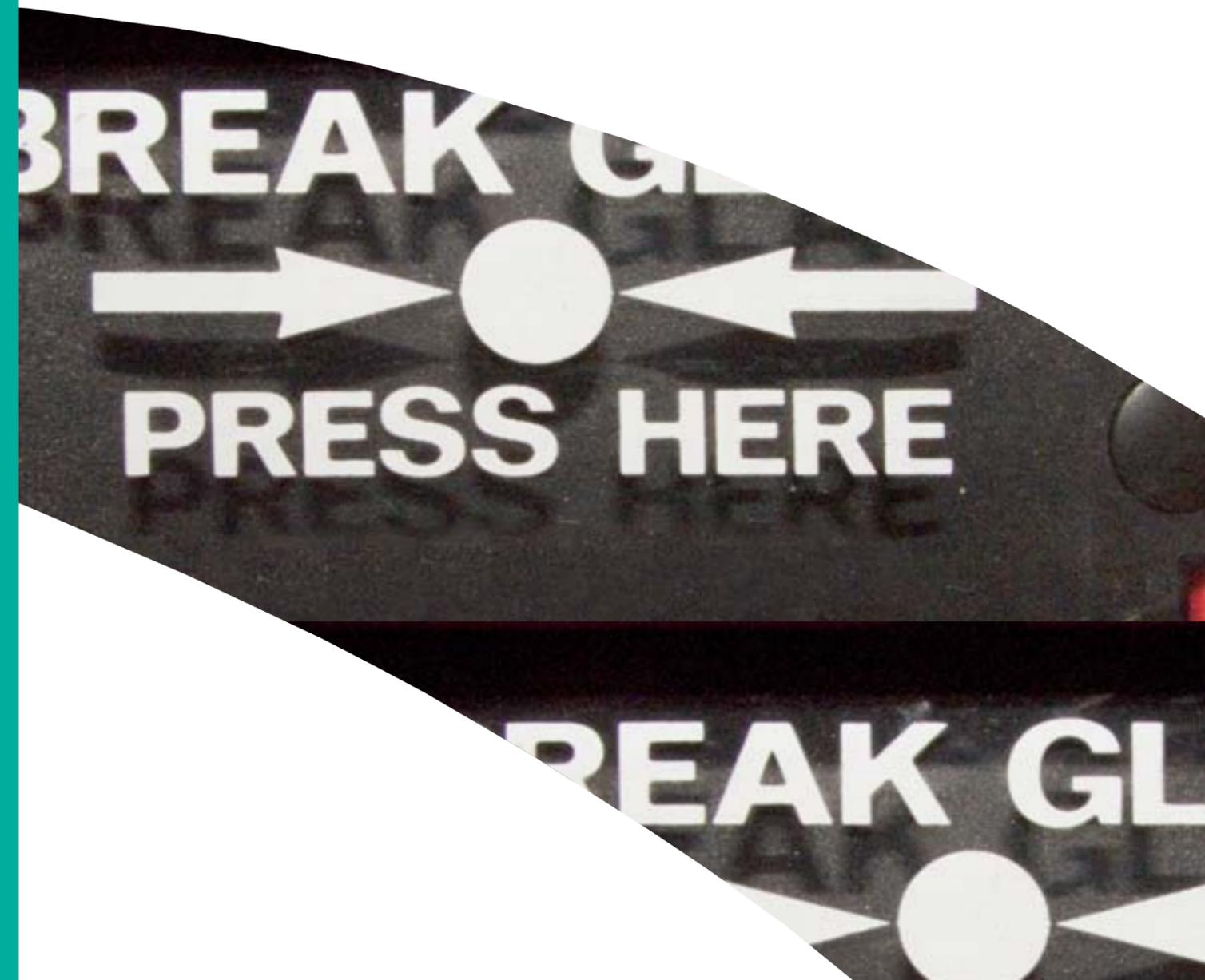


# Firecode – fire safety in the NHS Health Technical Memorandum 05-03: Operational provisions

*Part B: Fire detection and alarm systems*



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HR / Workforce Management	Performance	
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# **Firecode – Fire safety in the NHS**

## **Health Technical Memorandum**

### **05-03: Operational provisions**

#### **Part B: Fire detection and alarm systems**

*This document replaces Health Technical Memorandum 82*



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# Executive summary

This Firecode document provides guidance on the design and installation of new fire detection and alarm systems in NHS healthcare premises.

It is intended to supplement BS 5839-1 by providing recommendations specific to NHS healthcare premises.

It is therefore essential that this document be read in conjunction with BS 5839-1.

As part of the fire safety management of healthcare premises, the number of unwanted fire signals (UwFS) should be minimised. Instances of UwFS impact upon the treatment and care of patients and can result in the loss of appointments, disruption to care and treatment regimes, and can significantly affect staff morale. This document should be read in conjunction with Health Technical Memorandum 05-03 Part H – ‘Reducing unwanted fire signals in healthcare premises’ (formerly Fire Practice Note 11).

This document should also be read with other relevant Firecode documents.

The document covers a wide range of alarm and detection technology, from conventional systems to multi-sensor detectors in addressable systems. There is also substantial information and guidance on design philosophy and technical recommendations.

Other forms of fire detection equipment not specifically covered by this Health Technical Memorandum may be acceptable. However, the onus rests with the designer to ensure that any other form of fire detection selected ensures that the principles of early detection and warning are maintained, whilst minimising the risk of unwanted fire calls and not compromising the safety of building occupants.

## Note

Where text appears in a shaded box, it is strongly recommended that the guidance be applied.

This document replaces Health Technical Memorandum 82.



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# 1 Introduction

## Scope and purpose

- 1.1 This document provides guidance on the design and installation of new fire detection and alarm systems for NHS healthcare premises that are in addition to, or different from, those covered by BS 5839-1.
- 1.2 It applies to both new and existing premises. It also covers modifications to existing fire alarm systems required by alterations or extensions to existing buildings.
- 1.3 This document may also be used as good practice guidance for the design and installation of fire detection and alarm systems in non-NHS healthcare premises.
- 1.4 The guidance is intended for those responsible for specifying, designing, installing or approving fire alarm systems, for example:
  - a. estates and fire safety staff of an NHS trust (including NHS foundation trusts) or Strategic Health Authority;
  - b. architects and mechanical and electrical consultants;
  - c. fire safety consultants;
  - d. building control officers;
  - e. local authority fire officers.
- 1.5 It is assumed that those using this document will be competent to do so. A person will be considered competent where they have sufficient technical training and actual experience or technical knowledge and other qualities, both to understand fully the dangers involved, and to undertake properly the statutory and Firecode provisions referred to in this document.

## 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 Health Technical Memorandum 05-02 Part A: 'Guidance to support functional provisions for healthcare premises' categorises occupants upon 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 intensive care/intensive therapy units, operating theatres and those where evacuation would prove potentially life threatening.

- 1.8 Where the premises will be used solely as office accommodation or contain no patient access (including as part of the means of escape), the fire detection and alarm systems should follow the recommendations of the relevant part of BS 5839.

- 1.9 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.

## Relationship to BS 5839-1

- 1.10 The British Standard for the design and installation of fire detection and alarm systems in buildings is BS 5839-1. It is a code of practice containing general recommendations covering a wide range of building types. Although applicable, it does not provide recommendations specific to the healthcare environment. Neither does it 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.
- 1.11 This document has been prepared to satisfy the need for more specific guidance. This document is intended to **supplement** BS 5839-1 by:
- applying the recommendations of the British Standard to healthcare premises occupied by dependent and highly dependent 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.
- 1.12 In view of this, it is important to note that **this document must be read in conjunction with BS 5839-1**, and that the guidance in this document does not represent any lowering of standards in relation to fire alarm systems. Where this document amends any requirement of the British Standard, for example reducing audibility levels in patient areas, this should be recorded on the relevant certificates (design, installation, commissioning).
- 1.13 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 specifications. It is therefore recommended that contracts should also include appropriate technical specifications interpreting these recommendations to suit the particular site circumstances.

- 1.14 No additional recommendations relating to user responsibilities over and above those in BS 5839-1 are contained in this document. Those responsible for managing and maintaining fire alarm systems should therefore refer to BS 5839-1 for recommendations on procedures, training, servicing and for the prevention of unwanted fire signals (UwFS). Health Technical Memorandum 05-03 Part H should also be considered in adopting suitable measures to reduce UwFS.

## Function of fire alarms in dependent occupant environments

- 1.15 The function of fire alarms in premises accommodating dependent or very high dependency patients is to give warning to staff in the event of fire so that an early call to the fire and rescue service, first-aid fire-fighting and evacuation may be carried out. In contrast with most other types of building, these premises contain wards and 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 etc is necessary will depend largely on the overall fire safety strategy, tailored specifically to the occupant profile.

## Consultation

- 1.16 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; for example, where mental health patients are present, and there is a risk of absconding, it may be inappropriate to immediately release magnetically locked final exits (see also Appendix H of Health Technical Memorandum 05-02). The specifier/designer of the system should therefore consult all those concerned with the design and operation of the system, for example:
- managers;
  - fire safety advisers;
  - estates and facilities management staff;
  - building control officers/approved inspector/local authority fire officers (as appropriate);
  - relevant healthcare staff (especially those who have a role in responding to alarms);
  - insurers (where appropriate);

g. installing contractors and equipment suppliers.

Where practicable, this should be carried out before awarding the contract for the system.

## Other Firecode documents

1.17 This document is referred to in other documents within the Firecode suite, some of which contain recommendations on fire detection and alarm systems. This document 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 of products and services

1.18 Companies involved in the manufacture, supply and installation of fire alarm systems for healthcare premises should be certificated to the appropriate part of the Quality Standard BS EN ISO 9000.

1.19 It is also recommended that preference be given to systems and components that have been independently tested for conformity against a relevant product standard. Similarly, installers should also have been independently assessed.

1.20 A number of third-party certification schemes now exist for fire alarm products and services. For example, the LPCB<sup>1</sup> operates schemes for installers (LPS 1014) and alarm monitoring centres (“central stations”) (LPS 1020). These schemes have been adopted by BAFE.<sup>2</sup> Trusts are advised to select products and services with third-party accreditation.

---

1 Loss Prevention Certification Board

2 The British Approvals for Fire Equipment (BAFE) is a national approvals body set up to promote the use of certificated fire protection equipment, installation and maintenance services. BAFE adopts as National Schemes those run by certification bodies accredited by the United Kingdom Accreditation Service, and owns and controls quality markings for use in conjunction with such schemes

## 2 Definitions

2.1 Terms used throughout the Firecode series and this Health Technical Memorandum have the same meaning.

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

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

**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.

**Central station:** a continuously manned 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.

**Escape route:** a circulation space or dedicated fire exit route, including a stairway and the healthcare street.

**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 (see [Appendix 2](#)).

**Hazard departments:** departments/management units which contain high fire loads and/or significant ignition sources (see [Appendix 2](#)).

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

**Healthcare street:** the main route of ingress and egress for staff, patients, visitors, supplies and services, and constructed as a compartment.

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

**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.

**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 determine visually the position of a fire.

**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. They are further sub-divided into:

- a. Category L1: systems installed throughout all areas of the building. The objective of a Category L1 system is to offer the earliest possible warning of fire, so as to achieve the longest available time for escape;
- b. Category L2: systems installed only in defined parts of the building. A Category L2 system should include the coverage necessary to satisfy the recommendations of this standard for a Category L3 system; the objective of a Category L2 system is identical to that of a Category L3 system, with the additional objective of affording early warning of fire in specified areas of high fire hazard level and/or high fire risk;
- c. Category L3: systems designed to give a warning of fire at an early enough stage to enable all occupants, other than possibly those in the room of fire origin, to escape safely, before the escape routes are impassable owing to the presence of fire, smoke or toxic gases;

### Note

To achieve the above objective it will normally be necessary to install detectors in rooms which open onto an escape route.

- d. Category L4: systems installed within those parts of the escape routes comprising circulation areas and circulation spaces, such as corridors and stairways. The objective of a Category L4 system is to enhance the safety of occupants by providing warning of smoke within escape routes;

### Note

The installation of detectors in additional areas is not precluded, and the system could then still be regarded as a Category L4 system.

- e. Category L5: systems in which the protected area(s) and/or the location of detectors are designed to satisfy a specific fire safety objective (other than that of a Category L1, L2, L3 or L4 system). Often the design is based on a fire risk assessment or forms part of a fire engineering solution. Protection may be provided to compensate for some departure from normal guidance elsewhere or as a part of the operating system for a fire protection system. Such a system could be as simple as one that incorporates a single automatic fire detector in one room (in which outbreak of fire would create undue risk to occupants, either in the room or elsewhere in the building), but the system could comprise comprehensive detection throughout large areas of a building in which, for example, structural fire resistance is less than that normally specified for buildings of that type.

### Note

The protection afforded by a Category L5 system might, or might not, incorporate that provided by a Category L2, L3 or L4 system.

**Two-stage alarm:** an arrangement in which the system gives an “evacuate” signal in the compartment or sub-compartment of alarm origin and an “alert” signal in neighbouring compartments/ sub-compartments and/or other defined areas (for example basements)

**Unwanted fire signal (UwFS):** an incident resulting in the undesirable activation of the fire detection and alarm system.

**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:

- a. the indication of the occurrence of a fire (detection zone);
- b. the giving of a fire alarm (alarm zone).

## 3 System technology

- 3.1 Addressable fire alarm systems (see [Appendix 1](#)), in which signals from each detector and each call point are individually identified at the control panel, are of particular benefit and are preferred over conventional systems (see [Appendix 1](#)). Rapid identification of the source of an alarm can aid evacuation and first-aid fire-fighting. In the event of 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 boilerhouses.
- 3.2 In large healthcare buildings in particular, fire alarm systems using analogue detectors (see [Appendix 1](#)) are preferred because of their potential to reduce UwFS. This is particularly the case if the systems' controlling software uses algorithms to filter out UwFS. However, even simple multi-sensor detectors capable of giving a pre-alarm warning can be beneficial.
- 3.3 In future, the use of multi-sensor detectors (see [Appendix 1](#)) may enable further reductions in the rate of UwFS (see [paragraphs 5.15–5.17](#)).
- 3.4 Where additions to an existing system are necessary, or a fire alarm system is installed in an extension or 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 manufacture to be used, unless addressable systems of different manufactures can be fully interconnected.
- 3.5 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, 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 later as finances permit.
- 3.6 The system technology employed should be in accordance with the following guidance:
- up to 50 devices (that is, detectors/call points), the system may be of the conventional type;
  - over 50 but no more than 100 devices, the system should at least be addressable;
  - over 100 devices, 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 no more than 50 detectors/call points; or
  - requiring more 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

### Protection

- 4.1 Fire detection and alarm systems in healthcare premises are primarily intended to protect life, but they also have a role in protecting property. Early warning of fire can also be of benefit in minimising disruption to the functioning of the premises and in ensuring prompt resumption of service.
- 4.2 The extent of protection will depend on the particular local site circumstances. While in some cases it will be appropriate for all parts of a building to be protected, 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.
- 4.3 In assessing fire risk, account should be taken of the economic consequences of a fire. 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 and pharmacy;
  - causing prolonged vacation of parts of the building due to fire-fighting operations and subsequent building restoration;
  - destroying critical records;
  - damaging or destroying reserve and back-up life-saving equipment in storage, for example neo-natal, theatre or intensive care apparatus.
- 4.4 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 of 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;

#### Note

High value can refer not just to financial considerations but to the continued provision of care.

- there is adequate fire separation between the area and adjoining patient access areas.

4.5 Examples of areas where detectors may possibly be omitted are as follows:

- administration offices (other than in-patient access areas);
- telephone switchboards that are continuously manned.

4.6 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 hospital premises. However, detectors need not normally be provided in the following areas:

- voids and roof spaces of any depth which contain only:
  - MICC or wiring clipped to a metal tray or within metal conduit or trunking;
  - non-combustible pipework and ducts;
  - metal or plastic pipes used for water supply or drainage;
- bath/shower rooms;
- toilets in staff areas;
- small cupboards (less than 1 m<sup>2</sup>);
- operating theatres.

In any case the omission of detectors should be subject to a risk assessment.

4.7 Detectors should only be omitted from other areas on the basis of an assessment of fire risk. However, the following areas should always be 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, and corridors used as means of escape where not in frequent use;
- patient hotels;
- commercial enterprises;
- atria;
- mechanical and electrical services plantrooms (other than water tank rooms);
- toilets intended for use by the public.

4.8 Omission of detectors from any area should be the subject of consultation (see [paragraph 1.16](#)).

## Zoning

4.9 The building should be divided into zones for the purpose of indicating the presence of fire (detection zones) and giving the alarm (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](#)).

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

4.11 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.

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

## Alarm

4.13 In some 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).

4.14 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 building.

4.15 In at least patient access areas, a two-stage alarm system should be operated, such that the sub-compartment/compartment from which the alarm has originated receives the “evacuate” signal and adjacent sub-compartments/compartment receive the “alert” signal (see [Figure 2](#) for a typical two-stage alarm arrangement). However, to operate a two-stage alarm, there must be adequate acoustic separation between areas in which the “evacuate” signal will be given and areas in which the “alert” signal will be given.

4.16 Consideration should 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). It is essential that there are facilities to start “alert” or “evacuate” signals in other areas to permit subsequent phases in the evacuation of the building to be controlled by staff and/or the fire and rescue service.

4.17 To avoid unnecessary disturbance, staff elsewhere in the building who are required to perform particular tasks in the event of a fire should be alerted by means other than the sounding of the fire alarm (for example by pagers).

## Dependent patients

4.18 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

Figure 1 Zoning

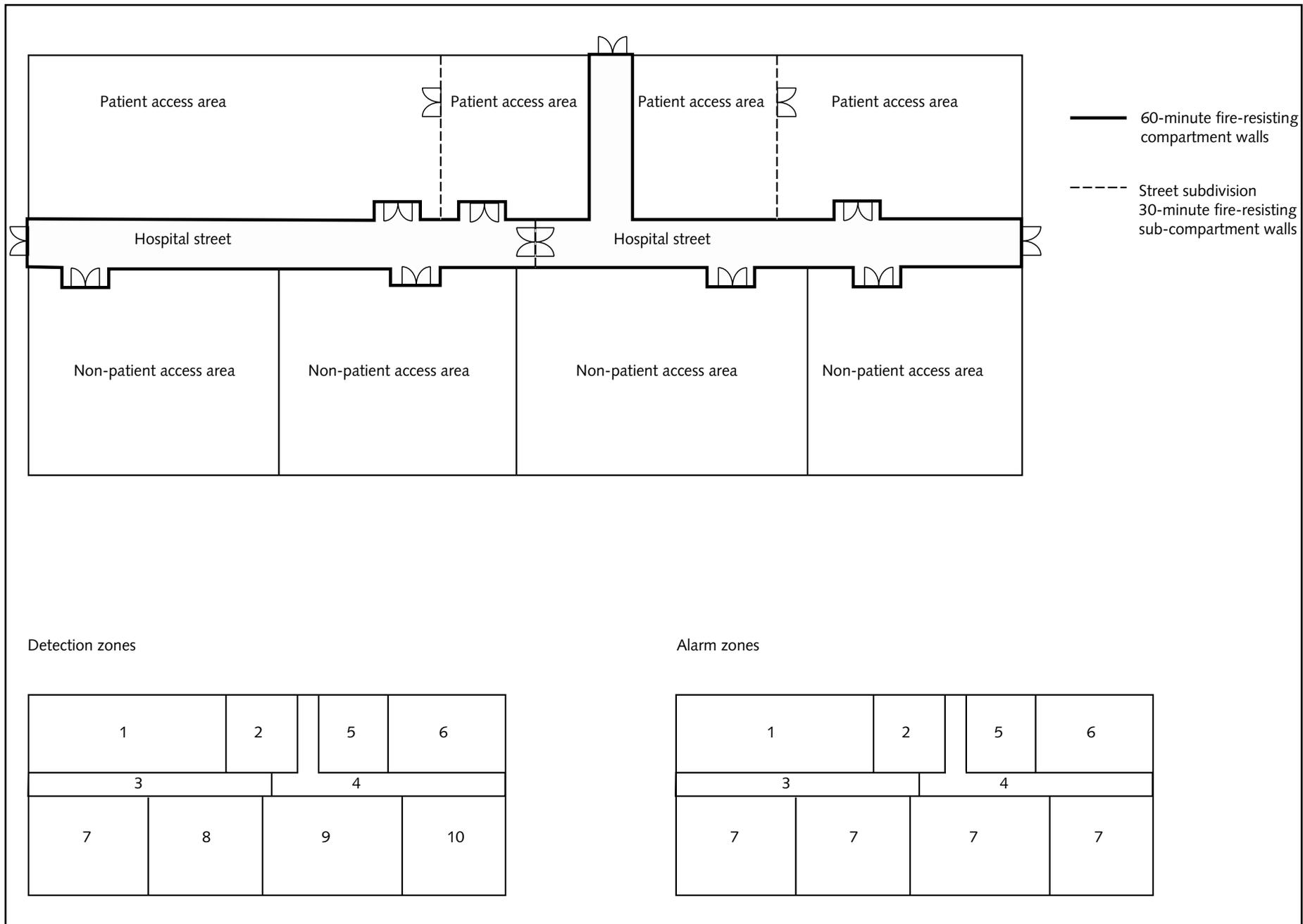


Figure 2 Cause/effect diagram

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                      ○ Alert

Zoning

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

unable to evacuate unassisted, and this may cause confusion and distress.

**Mental health patients**

4.19 The alarm system serving this occupancy should be configured in a manner appropriate to the needs of the patient profile.

4.20 It is generally accepted that, when confronted with high sound pressure levels, mental health patients present a risk of reacting adversely in a manner that may prove detrimental to an evacuation. It is recommended that the design of the alarm system take account of the nature of the occupants and mitigates the potential for this unpredictable reaction. 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.

**Very high dependency patients**

4.21 The well-being of these occupants 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.

4.22 In areas where patients can escape unaided and in non-patient access areas, the audibility of the alarm should be in accordance with BS 5839-1.

4.23 Audible alarm devices should 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 in excess of this should be avoided.

4.24 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.

4.25 Visual alarm devices may be provided as an alternative to alarm sounders in areas where an audible alarm is unacceptable, for example very high dependency patient access areas, such as operating theatres, ITU and special care baby units.

4.26 In some healthcare premises, it may be desirable (or beneficial) to incorporate the use of voice alarm systems. Any voice alarm system must comply with BS 5839-8.

**System control and display of information**

- 4.27 Information on the existence and source of an alarm is required for the following purposes:
- a. to enable the fire and rescue service to be summoned;
  - b. to allow staff to respond in accordance with local evacuation procedures;
  - c. to guide the fire and rescue service to the source of the alarm.

- 4.28 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.
- 4.29 The necessary control and indicating equipment, 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 also 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.
- 4.30 In large healthcare premises in particular, repeat control and/or indicator panels may also be required at points where staff rendezvous. It may also be desirable to give information to staff not directly involved, to make them aware of the alarm and the possibility that evacuation may be necessary. This could be achieved by, for example, the use of repeat alphanumeric text displays at nurse stations.
- 4.31 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.
- 4.32 As a minimum, control and indicating equipment should be provided at the main entrance to the premises (or at the entrance at which the fire and rescue service attend, if different). Control and indicating equipment should also be provided in a location supervised 24 hours a day (for example telephone switchboard), where present.
- 4.33 Additional control and indicating equipment, capable of displaying the location of an alarm incident to a similar degree to that of the main panel, should be provided in each and every management unit, and in any case such that the travel distance to an indicator panel does not exceed 60 m. Further control and indicating 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 (see [paragraph 1.16](#)).
- 4.34 Manual alert/evacuate controls for each alarm zone should at least be provided at the fire and rescue service entrance, but may also be required at other locations depending upon local evacuation procedures.

## Ancillary services

- 4.35 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 may include:
- a. automatic door releases and door control systems;
  - b. access control systems;
  - c. ventilation and damper control systems;
  - d. fuel supplies;
  - e. lifts;
  - f. fixed extinguishing systems;
  - g. smoke control systems;
  - h. stairway pressurisation systems;
  - j. site signalling system;
  - k. shutters.
- 4.36 It may not always be necessary to actuate ancillary services when the fire alarm system operates. For example, electronic locks securing exit doors may not need to be released automatically if a manual means of override is present by the door. Similarly, whilst it may be prudent to return passenger lifts to the ground floor and disable them, this would not be appropriate for escape bed lifts. It is important, therefore, that the need for actuation of ancillary services is established in the light of the local overall fire safety strategy, statutory requirements, and through consultation.
- 4.37 The cause and effect logic for the actuation of ancillary services should be documented, preferably in the form of a diagram. This should be part of the specification for the system.
- 4.38 The cause and effect logic for the actuation of ancillary services should be based on the following.

## Automatic door releases and door control systems

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

- a. the door release mechanism should conform to both BS 5839-3 and BS EN 1155 and be fail-safe (that is, in the event of a fault or loss of power the mechanism should release automatically);
- b. all doors fitted with automatic door releases should be linked to the alarm and detection system to support the fire strategy;
- c. all automatic door releases within a compartment/sub-compartment should be triggered by all of the following:
  - (i) the actuation of any automatic fire detector within the compartment/sub-compartment (see also [paragraph 4.37](#));
  - (ii) the actuation of any manual fire alarm call point within the compartment/sub-compartment (see also [paragraph 4.37](#));
- d. automatic door releases must be provided with a ready means of manual operation from a position at the door.

**4.40** As a minimum, automatic door releases should be arranged to automatically close doors, both within and forming the boundary of alarm zones where the “evacuate” and “alert” signals are sounded.

**4.41** Doors to staircases should not be held open by means of door hold-open devices.

## Access control systems

**4.42** Where required, access control systems should automatically release (unlock) doors forming exits from alarm zones where the “evacuate” signal is sounded.

**4.43** The operational policy and procedures necessary to deal with the changes of patients’ wellness as treatment progresses, together with the diversity of reactions to noise and movement that affect them, may create specific difficulties.

**4.44** The alarm and detection system must 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.

**4.45** 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.

## HVAC

**4.46** Mechanical ventilation and air-conditioning systems should not normally be stopped when the fire alarm system operates. However, where there is a full or partial recirculation system in an alarm zone in which the “evacuate” signal is given, the extract should be diverted to discharge to the open air.

**4.47** Where required as part of the contract for the fire alarm system, manual controls to allow the fire and rescue service to control ventilation plant should be sited either adjacent to the fire alarm control panel or adjacent to the department entrance.

## Lifts

**4.48** 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. Escape lifts should not be controlled by the fire alarm system once brought back into service by the operation of the “evacuation control switch”.

## Smoke control systems

**4.49** Smoke control and extract systems in, for example, atria, commercial enterprises and basements should

only be actuated automatically when fire is detected in the areas they serve.

## Communication with the fire and rescue service

- 4.50 It is essential that, when an alarm of fire occurs in patient access areas, the fire and rescue service is summoned immediately. As a minimum, healthcare staff should summon the fire and rescue service using the 999 emergency service. However, it may also be necessary to arrange for fire alarm signals to be transmitted automatically to the fire and rescue service or to a remote centre from where the fire and rescue service can be summoned.
- 4.51 Remote centres may comprise:
- a. NHS premises, such as an ambulance control centre or a permanently manned telephone switchboard of another healthcare facility;
  - b. central stations.
- 4.52 Where other NHS premises are used, the standards of service and facilities offered should be equivalent to those of central stations. Preference should be given to remote centres that have third-party certification.
- 4.53 The Public Switched Telephone Network (PSTN) is not specifically designed for the transmission of fire alarm signals. Therefore, the use of digital communicators or auto-diallers is not generally recommended.
- 4.54 The fire alarm system should be connected direct to the fire and rescue service or a remote centre, unless it is monitored in a location that is continuously manned on a 24-hour basis by at least two persons whose duties include summoning the fire and rescue service, and who have immediate access to a dedicated outgoing telephone line or a direct speech circuit to the local fire and rescue service control room.
- 4.55 The method of transmitting alarms to the remote centre should be by a reliable continuously monitored connection such as a direct line or the British Telecom RedCARE system. Radio networks (for example ambulance radio or Paknet) may be used provided that there is regular monitoring of the communications path, and the system is of proven reliability.
- 4.56 Remote centres should be designed and operated in accordance with BS 5979.
- 4.57 Health Technical Memorandum 05-03 Part H recognises the potential for disruption and unnecessary mobilisation of fire response personnel, and provides guidance on the possibility of delaying a call to the fire and rescue service in order to permit an investigation of an alarm incident and the need for fire-fighting resource. Any such investigation must be carried out promptly and procedures discussed beforehand with the fire and rescue service. Patient safety must not be compromised by this process.

## 5 Technical recommendations

### Manual call points

- 5.1 Although BS 5839-1 generally permits a 45 m 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 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 actually required.
- 5.3 In order 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 detection zones (that is, on each direction of approach). This is particularly important in the case of main doorways between compartments and between sub-compartments.
- 5.4 With the above exceptions, the type, siting and location of manual call points should normally be in accordance with the recommendations of BS 5839-1.
- 5.5 Throughout healthcare premises, manual call points should be installed at a height of not more than 1.2 m above finished floor level.
- 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 detection zones (in close proximity to 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 patients.
- 5.9 In certain circumstances where patients cause considerable problems with 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.
- 5.10 In mental health units, manual call point type and siting may deviate from the recommendations of BS 5839-1 if unwanted fire signals (UwFS) are likely to occur due to deliberate operation of call points by patients. 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.

### Automatic fire detectors

- 5.11 Normally, the use of point-type smoke detectors is appropriate in all areas in which this document recommends the provision of detectors. Exceptions

are areas in which the use of smoke detectors would result in constant UwFS (for example kitchens); in these areas, point-type heat detectors should be used.

- 5.12 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 entrance hall. Line-type heat detectors may be suitable for use in service tunnels. Flame detectors might be considered if, for example, the materials likely to be ignited are low-flashpoint flammable liquids. Aspirating smoke detection can be used for protection of critical equipment rooms (such as computer rooms).
- 5.13 In circulation spaces such as corridors and stairways, smoke detectors should normally be of the optical type, unless use of an ionisation chamber detector is necessary in order to avoid UwFS. In other areas in which smoke detectors are installed, either ionisation chamber detectors or optical detectors may be suitable; the guidance in BS 5839-1 on detector selection should generally be followed. However, choice of detector should take into account both the nature of the fire load (and hence the likely type of fire) and the importance of avoiding UwFS (see paragraphs 5.15–5.17). Nevertheless, effectiveness in fire detection should not be sacrificed in order to avoid occasional UwFS.
- 5.14 Where the fire detection system is used to actuate automatic door releases, it is essential that smoke detectors are present relatively close to the doors, on both sides of the opening. Provided detectors have not been omitted from an L1 system as part of a fire risk assessment, no additional detectors will be required. Where this is not the case, detectors should be provided on both sides of the door opening (typically 0.5–1.5 metres away) to ensure the correct operation of the automatic door release.

## Unwanted fire signals

- 5.15 Healthcare premises, predominantly hospitals, are often considered to be a major source of UwFS to which fire and rescue services are summoned. This does not necessarily reflect on the standards of fire alarm systems in healthcare premises, or on the standards of maintenance and control that exist. The NHS is one of the major users of automatic fire detection in the UK, and there are many very large systems in healthcare premises. Statistically, the greater the number of detectors that exist, the greater will be the number of UwFS. Moreover, healthcare premises are occupied 24 hours a day, and there is therefore greater scope for activities to create UwFS than in many other buildings. Also, the strictly disciplined fire procedures in healthcare premises probably result in the fire and rescue service being made aware of a greater-than-average proportion of UwFS.
- 5.16 In any building, UwFS 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 can ultimately result in a lowering in the standard of fire safety. It is therefore essential that the installation design be such as to avoid UwFS, as far as reasonably practicable. However, avoidance of UwFS should never take precedence over the need for effective detection and early warning in the event of fire.
- 5.17 The causes of fire detection and alarm system activation can be broadly classed as one of two incident types: fire; or UwFS. Since normal activities may result in the uncontrolled emission of heat and/or smoke, resulting in an undesirable activation of the fire detection and alarm system, it is possible for an alarm generated by a fire incident to be classed as a UwFS. Further detail and information regarding the means of classifying, recording, reporting and reducing UwFS can be found in Health Technical Memorandum 05-03 Part H.

## Audible and visual alarms

- 5.18 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 some circumstances. However, 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.
- 5.19 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 and reception areas, and they should comply with BS 5839-8: 'Code of practice for the design, installation and servicing of voice alarm systems'.

- 5.20 In those areas accommodating mental health patients, alarm devices should be of reduced volume and capable of alerting staff without causing unnecessary anxiety to the patients. The use of sound devices capable of broadcasting a pre-recorded message may be appropriate. In particular, such devices pre-recorded with a short clip of music are considered beneficial in circumstances where a discreet staff alarm is necessary.
- 5.21 The use of visual alarm beacons should be carefully considered. Many patients in mental health facilities exhibit photo-sensitivity, hence the inappropriate use of flashing beacons may lead to adverse patient reaction.

5.22 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.

- 5.23 Visual alarm devices should comprise flashing lights, preferably red, but other colours may be used; and 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. Consideration should be given to the potential for adverse reaction to flashing lights by those with photo-sensitivity. In any case the flash rate should not exceed 130 flashes per minute.

## Radio-linked systems

- 5.24 A well-designed and engineered radio-linked system could offer a number of advantages, such as ease of installation etc, most of which are discussed in BS 5839-1. Their main disadvantage is the need for periodic replacement of batteries, which may prove expensive and inconvenient. It is also known that systems have been produced that comply with the specific recommendations of BS 5839-1 relating to radio-linked systems, but not necessarily

with the spirit of other recommendations in the standard.

- 5.25 It is not intended that this document should constitute an obstacle to the use of radio-linked systems, provided such developments result in well-proven systems that satisfy all existing standards.
- 5.26 Wherever radio-linked systems are being proposed, the environment must be adequately surveyed to ensure the robustness of radio communications and the potential cumulative effects of the use of current and 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.
- 5.27 Subject to compliance with BS 5839-1 and this document, 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 replacement of an existing fire alarm system, perhaps before the new system is fully operational.
- 5.28 Permanent use of a radio-linked system should only be considered if the system is well proven and is preferably independently certificated against a suitable product standard (when such a standard becomes available). Any system proposed should be shown to comply in full with all recommendations of BS 5839-1 and this document.

## Electromagnetic interference

- 5.29 As indicated in BS 5839-1, fire alarm systems may be affected by various sources of electromagnetic interference, such as transmissions from radios or cellular telephones, voltage transients etc. Such interference may result in UwFS, system faults, malfunction of processors or other forms of malfunction. In healthcare premises, there are often numerous sources of interference, either in use by the public (for example cellular telephones) or in use for treatment of patients (for example diathermy equipment).

5.30 Experience has shown that some fire alarm systems are more immune to the effects of electromagnetic interference than others. It is also known that installation parameters, such as the type of cable used, the method of termination, and even the material from which items such as junction boxes are manufactured, may have an effect on the immunity or otherwise of an installation, as opposed to the immunity of the equipment in isolation. If adequate care is not taken, mutual interference can also occur between fire alarm circuits (for example “crosstalk” between loops in an addressable system).

5.31 All systems should comply with the requirements of the Electromagnetic Compatibility Regulations 2005 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. Particular 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 Health Technical Memorandum 06-01, which deals with the abatement of electrical interference.

## Power supplies

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 indicating equipment should be kept to the minimum practicable.

5.37 From the point at which the system (that is, 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 BS 7671 (IEE Regulations). Accordingly, the circuit should be suitably segregated from other circuits.

5.38 All cables associated with the fire alarm system, including power cables, should be rated “enhanced” fire resistance 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.

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.

# Appendix 1 – Available system technology

## Conventional systems

1. Up until the early 1980s, when new technology addressable systems (see below) were introduced into the UK, all fire detection and alarm systems employed similar methods of transmitting signals between fire detectors and control equipment. Basically, any zone of detectors comprises a single (usually two-wire) circuit. Each manual call point and fire detector within that zone is connected in parallel across the circuit.
2. In electrical terms, each device on the zone circuit simply acts as a normally open switch. When a manual call point is operated on such a system, or when a detector detects the presence of a fire, the “switch” closes, resulting in virtually a short circuit (that is, a low impedance) across the pair of wires. The low impedance on the circuit is sensed by the control equipment, which recognises this as a fire signal from one of the devices on the zone.
3. Electrically each zone is, therefore, a radial circuit, which terminates in the field at an “end of line” device, such as a resistor. The resistor permits a small monitoring current to flow at all times. If a break occurs in the cable (an “open circuit” fault) the monitoring current can no longer flow, and a fault warning is given at the control and indicating equipment. If a true short circuit occurs, this is also detected as a fault because the impedance is even lower than occurs when a detector or manual call point operates. Thus the system can detect, and distinguish between, an open-circuit fault (very high impedance), a fire signal (low impedance) and a short-circuit fault (very low impedance).
4. Each detector is a “two-state” device (sometimes described as a “digital” device) in the sense that it is either in the normal state (“switch” open) or fire state (“switch” closed). When one of the devices on a zone operates, the only information available is that there is a fire condition somewhere within the zone in question; the control panel cannot distinguish between one device operating and

another device on the same zone operating, as the effect will be exactly the same.

5. Systems of the above type are still available and are now usually described as “conventional” systems, to distinguish them from “addressable” systems.

## Addressable systems

6. In an addressable system, there is some form of individual communication between each detector and the control equipment. Each circuit is therefore a form of simple data communications circuit, rather than simply an electrical circuit. Communication is normally achieved by some form of “polling”, whereby the control equipment interrogates each detector or manual call point in turn, and the devices respond with “replies” that inform the control equipment about their present state. The time taken for the system to poll all devices on a single circuit must be sufficiently short to ensure that the delay between, for example, operation of a call point and sounding of the alarm is sufficiently short to satisfy BS 5839-1.
7. The principal difference between an addressable system and a conventional system is therefore that, when a detector or call point operates in an addressable system, the identity of the device is known at the control equipment, whereas a conventional system cannot discriminate between the operation of one device and another device on the same circuit.
8. Within the software of the addressable system, the device identity can be converted into a pre-programmed location, which is then displayed on some form of text display (such as an LCD or vacuum fluorescent display). Thus, a clear English text description of the exact location of a fire can be displayed (for example, Room 120 2nd Floor).
9. Although the exact location of the fire can be displayed, compliance with current British Standards still requires that a more crude form of zone indication is also given. However, in a

conventional system each zone is defined by an individual circuit, whereas in an addressable system, the devices within many zones may be connected to a single circuit. Since, in the event of a fire signal, the exact identity of the device involved is known, detectors and call points are configured into zones within the system software. This permits greater flexibility in zoning, and allows extra zones to be created at minimal cost.

10. The wiring in most addressable systems takes the form of a ring circuit (or “loop”), which initiates and terminates at the control equipment. In the event of an open-circuit fault, a warning is given, but communication with all devices is maintained, as there is still one signal path (instead of the original two) between each device and the control equipment. Radial circuits can be used, either wired directly from the control equipment or as “spurs” off main loops.
11. If a short circuit occurs on an addressable loop that serves many zones, this could potentially result in loss of protection in all the zones concerned. To avoid this, short-circuit isolators are employed. These isolate at least the section of the loop involved. By siting short-circuit isolators at zone interfaces, it is possible to limit the loss of protection to the area of one zone (or at least to the maximum area permitted for a zone). In some systems, short-circuit isolators are fitted to each detector base, so that no loss of protection occurs in the event of a short circuit.
12. Some addressable systems are capable of transmitting instructions to addressable devices on the loop, as well as receiving information from detectors or call points. Thus, for example, when a fire is detected, an addressable relay may be instructed by the control panel to operate, so closing doors, shutting down plant etc. In a small number of systems, alarm sounders may also be addressable; this enables economies in wiring by installing sounders on the same addressable loops as fire detectors and call points.

## Types of addressable system

### Two-state

13. In the simplest of addressable systems, detectors are still of the two-state type. The detectors themselves make the decision as to whether or not there is a fire. The only difference between these detectors and those in a conventional system is that, when

the addressable detector generates a fire signal, it also transmits its identity. The rate of UwFS generated by a two-state addressable system should, in theory, be no different from the rate generated by a conventional system.

### Analogue

14. The majority of addressable systems are not of the two-state type, but are of the analogue/addressable type. In these systems, the detectors themselves do not make any decision as to whether or not there is a fire. Instead, the detectors (often described in this case as “sensors”) simply transmit to the control equipment a signal level that represents the amount of heat, smoke or flame that is being sensed. The decision as to whether or not this signal level represents a fire condition is taken at the control equipment.
15. In the simplest analogue systems, the control equipment merely applies “fixed thresholds” to the signal level from each detector. Thus, for example, above a certain threshold a “pre-alarm warning” may be given, representing a state that requires investigation as it may be due to either a small fire or contamination of the detector by some non-fire products. At a higher threshold, a fire signal would be given. At a very low signal level, a fault signal may be given to indicate that the detector has become very insensitive. Such a system is thus four-state (Fire, Pre-Warning, Normal, Fault), compared with the two-state nature (Fire, Normal) of a conventional or simple addressable system.
16. Greater sophistication in analysis of the analogue signals is incorporated into some analogue systems in order to reject as many UwFS as possible. Analysis of the rate of rise of signal level may also enable earlier detection of fire, while eliminating certain types of false alarm.
17. Most analogue systems also have facilities to read off the current analogue values of all detectors on the system. This can enable identification of detectors that need to be cleaned or of detectors that are more prone to UwFS due to high levels of pollutants in their environment.

### Multi-sensor

18. In the past, each detector head has been capable of sensing just one of the characteristic phenomena of fire (heat, smoke or flame) by just one technique (for example optical scattering or use of an ionisation chamber).

19. In multi-sensor detector systems, each detector head incorporates more than one sensor and so is capable of detecting more than one phenomenon. In some systems, by comparing the signals from the different sensors it is possible to avoid certain UwFS. For example, whereas an optical detector close to a source of steam may produce UwFS, a detector that incorporates a heat or ionisation chamber sensor may not produce a false alarm because of the absence of sufficient signal level from the heat or ionisation chamber sensor.
20. Multi-sensor detector systems are still relatively uncommon, and there are only a few commercially available systems. There is some experience to suggest that multi-sensor detectors can significantly reduce UwFS, particularly in “difficult” environments. A European Standard for multi-sensor systems is in the course of preparation. It is likely that these systems will become more common during the life of this Health Technical Memorandum.

## Appendix 2 – Fire hazard rooms and areas and hazard departments

The following are examples of fire hazard rooms:

- Chemical stores;
- Cleaner's rooms;
- Clothes storage;
- Dayrooms;
- Disposal rooms;
- Laboratories;
- Lift motor rooms;
- Linen stores;
- Patient bedrooms provided for:
  - a. those suffering a mental illness;
  - b. people with learning difficulties;
- Relatives' overnight rooms;
- Staff changing and locker rooms;
- Staff (overnight) on-call rooms;
- Store rooms;
- Ward kitchens;
- X-ray film and record stores;
- all rooms within the main laundry in which delivery, sorting, processing, packing and storing are carried out.

The following are hazard departments:

- Atrium;
- Boilerhouse;
- Central staff change;
- Central stores;
- Commercial enterprises;
- Central sterile supplies or healthcare sterilizing and disinfecting unit;
- Flammable store;
- Health records;
- Laundry;
- Main electrical switchgear;
- Main kitchens;
- Main stores;
- Medical gas stores;
- Pathology;
- Pharmaceutical (manufacturing);
- Refuse collection/incineration;
- Works.

This list is not exhaustive nor comprehensive. The responsibility is upon the designer to assess the level of fire risk in any location.

## References

### Acts and Regulations

#### **The Electromagnetic Compatibility Regulations 2005.**

SI 2005 No 281. HMSO, 2005.

<http://www.opsi.gov.uk/si/si2005/20050281.htm>

### British Standards

#### **BS 5839 Fire detection and alarm systems for buildings:**

Part 1: 2002 Code of practice for system design, installation, commission and maintenance.

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

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

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

**BS EN 54-2: 1998** Fire detection and alarm systems. Control and indicating equipment.

**BS EN 54-4: 1889** Fire detection and fire alarm systems. Power supply equipment.

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