A GUIDE TO BS 5839-1:2025



Honeywell

Fire Detection Systems

This Design and Installation Guide provides guidance for the provision of a fire detection and alarm system in accordance with the recommendations detailed within the British Standard Code of Practice BS 5839-1:2025. It is designed to act as a memory-aid and there is no substitute for reading the full Standard, copies of which can be obtained from the British Standards Institute: 389 Chiswick High Road, Chiswick, London, W4 4AL. Tel: 020 8996 9001. Web: www.bsi-global.com Email: orders@bsi-global.com

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INTRODUCTION

This guide, due to its size, provides a basic overview to anyone involved in the design or action of a fire detection system. It will identify the current legislative requirements as well as clarify the responsibilities placed on the three key roles involved with the provision of a new system, namely the Designer, Installer and Commissioning Engineer, as well as reminding the End User or Owner/Occupier what part they play in ensuring that the best possible system is supplied to protect life and property from fire.

It is important that everyone involved is conversant with the current British Standard Codes of Practice BS 5839-1:2025 for general buildings and should also be conversant with the British Standard relating to general wiring BS 7671:2018/A3:2025. The guide, which has been prepared by Honeywell, one of the UK's largest manufacturers of fire detection systems, is intended to offer practical advice and is not a substitute for any of the Standards or legislation referred to.

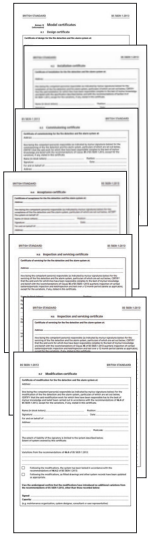
Legal elements

- Regulatory Reform Fire Safety Order 2005
- The Equality Act 2010 (formerly the Disability Discrimination Act 1995)
- Building Regulation Approved Document Part B
- Building Regulation Approved Document Part M

All these documents in some way affect what is included in the system. However, the Owner/Occupier is ultimately responsible for the level of protection provided.

It is recommended that the Owner/Occupier carries out a Fire Risk Assessment to identify the level of protection required i.e. one of the categories detailed within BS 5839-1:2025 (L1, L2, L3, L4, L5, M, P1 or P2)

The full responsibilities of the Owner/Occupier are detailed within the new Regulatory Reform Fire Safety Order (RRO) that replaced the majority of existing laws within the UK from October 2006.



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SYSTEM DESIGN

Any design should be prepared by a competent individual/organisation, who has consulted all interested parties and created a set of drawings, a specification, a Cause & Effect or fire plan, a list of Variations and completed a Design certificate, detailed within BS 5839-1:2025. If designs are undertaken without this research being carried out, the fire detection system is unlikely to comply with the legal requirements. This could result in prosecution of the parties involved, particularly those within the supply chain as well as the Owner/Occupier.

WARNING: Anyone who takes on the responsibility for Design will do so at their own risk and Design Liability Insurance is advisable.

The Designer's responsibilities:

- Agree the level of protection or category with Owner/Occupier
- Justify any Variations and document reasons
- Detail the Detection and Alarm Zones
- Prepare specification and drawings including;
  - Siting of Manual Call Points
  - Siting of point type Heat and Smoke Detectors
  - Siting of Beam Detectors
  - Siting of any other forms of detection
- Specify type of cable for each circuit
- Specify type of system and equipment
- Specify links to other equipment
- Take into account the risk of false alarms
- Allow for correct level of Sounders and Visual Alarms
- Prepare a fire plan or Cause & Effect chart
- Sign a Design certificate

Note: BS 5839-1:2025 recommends that a fire detection system is designed by a competent person, who takes responsibility for completing the design and signing of a 'Design certificate'. This should not be confused with other certificates relating to Installation and Commissioning, that are completed by the parties responsible for those parts.

Also if the contract allows, it is suggested that the Designer witness tests the completed system to ensure the original design is still appropriate – the Design certificate can then be completed after any amendments are included.

Design Stage 1

Talk to the interested parties to decide on the level of protection or category and agree Variations.

The importance of pre-design planning cannot be overstated. Many parties are likely to have an interest in what the fire detection system is expected to do. Ultimately it is up to the Owner/Occupier, who is responsible by law, to make the final decision on the level of protection provided for a particular building.

In most circumstances the Owner/Occupier will appoint a competent Designer to carry out this work and take liability for the design as a whole.

The nominated Designer is expected to consult the following organisations:

- The User or Facilities Manager
- The Building Control Officer
- The Health and Safety Executive
- The Insurer
- The local Fire and Rescue Service
- A specialist fire alarm system supplier

Issues to be covered by the Designer should include:

- The Fire Risk Assessment demands
- The requirements necessary to comply with the Regulatory Reform (Fire Safety) Order (RRO) 2005, the Equality Act 2010 (formerly the Disability Discrimination Act 1995) and Building Regulations Approved Documents Part B and Part M
- The prime purpose of the system (Property or life protection or both)
- The level of protection suggested by the interested parties. (Category P1 or P2, M or L1 L2 L3 L4 or L5)
- The list of Variations identified by the interested parties



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DESIGN STAGE 1

Determine the System Category or level of protection.

Systems designed for Protection of Property only, fall into two classifications: P1 or P2.

The objective of a Category P1 is to provide the earliest possible warning of a fire to minimise the time between ignition and the arrival of the fire fighters.

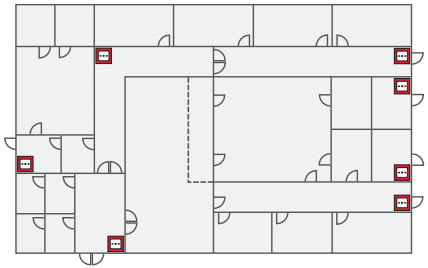
P1 is designed to protect the whole building whilst P2 is installed in defined parts of the building only, which may have an extraordinary high risk or hazard.

Life protection, on the other hand, will often depend on the number of people accessing a particular building and depending on the Variations, the systems can range from simple Type M to L1 categories, these being detailed in the following diagrams.

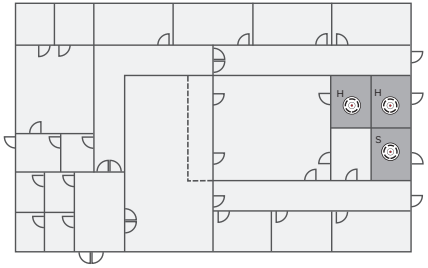
These diagrams show a typical building with a number of escape routes, side rooms and open plan areas used for escape.

A Category M system requires Manual Call Points on all exits as well as corridors where persons are not expected to walk more than 30/45m (see Design Stage 3) to operate one.

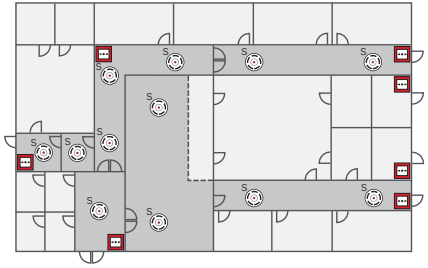
M



L5



L4



DESIGN STAGE 1

Category L5 designed for buildings that have a particular risk identified, which warrants some special attention.
For example, if there is an area of high risk that is considered worthy of having some automatic detection but a manual system is also needed, then this will be termed as L5/M.

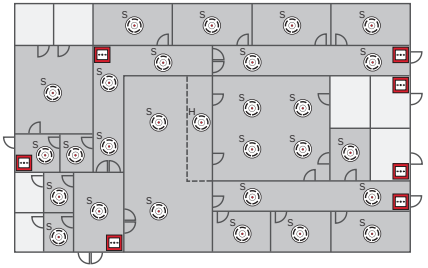
Category L4 provides detection within the escape route, as well as providing detection to flue structures and lift shafts.

Category L3 not only covers areas as per L4, but also all escape rooms leading onto the escape route. The reasoning behind this is to alert people of the danger prior to the corridor becoming smoke logged, therefore allowing people to escape safely.

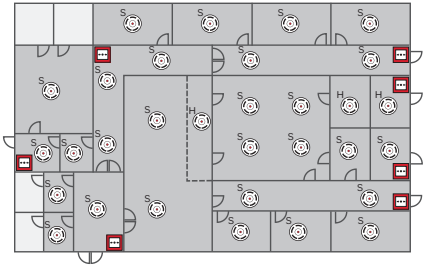
L2 is a further enhancement of protection with all the areas covered by a L3 category as well as all high risk areas such as boiler rooms etc.

L1 provides protection throughout the building to offer the earliest possible warning of fire, so as to achieve the longest available time for escape.

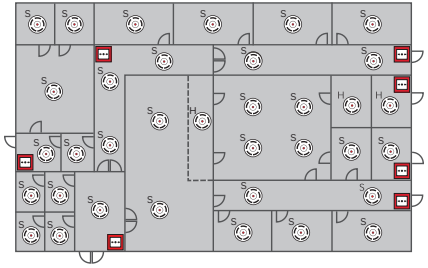
L3



L2



L1



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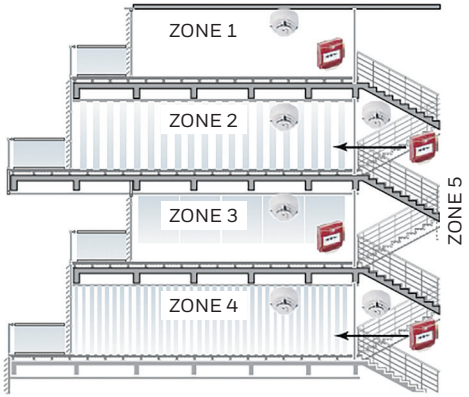
DESIGN STAGE 2

Detection and Alarm Zones

Generally, a building is broken down into smaller compartments to enable the fire fighters to locate the fire as quickly as possible. Even if the system is addressable, it is still considered beneficial to have a separate 'at a glance' indication of the location of the fire. These compartments of a building are called Detection Zones, which need to comply with the following criteria:

Detection zones

- A Detection Zone should cover no more than 1 storey, unless the total floor area is less than 300m^2. Voids in the same fire compartment should be included in the same floor Zone.
  The maximum floor area of a Zone should not be greater than 2,000m^2, except for some large open plan areas that incorporate Manual Call Points only, which can be extended to 10,000m^2. The maximum search distance for the fire fighters to see the seat of the fire within a Zone should not exceed 60m, assuming the route taken is the worst possible option. Vertical structures like stairwells, liftwells etc. should be considered as separate Zones.
- A Manual Call Point within a staircase should be connected to the Zone associated with that floor and ideally be mounted on the accommodation side of the corridor exit. Automatic sensors on the stairwell remain as part of the stairwell detection Zone.



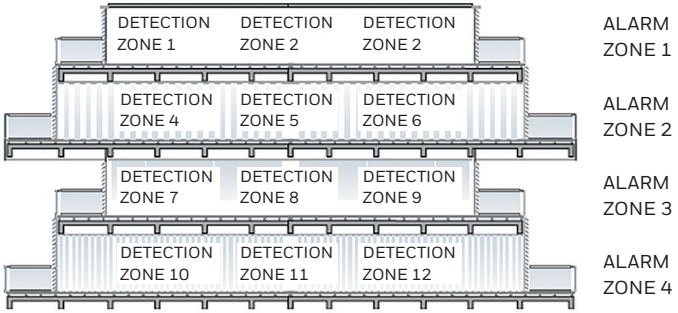
DESIGN STAGE 2

Alarm Zones

An Alarm Zone is clearly defined within the Standard, but generally is an area of the building coinciding with the fire compartment boundaries. There must be a clear break between these Alarm Zones to ensure alert and evacuation messages are not overheard from adjacent areas.

The only other criteria is that an Alarm Zone may consist of a number of detection Zones, but not vice versa.

Alarm Zones are only required when phased or staged evacuation is required. It is therefore important that care should be taken to ensure only one message is heard at any one time particularly where two Alarm Zones are attached.



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DESIGN STAGE 3

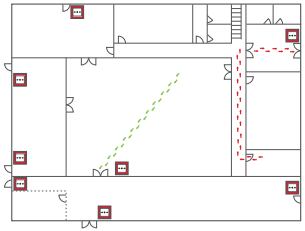
Siting of Manual Call Points

All Manual Call Points, whatever the system, should comply to BS EN 54-11 Type A version only and should be located as follows:

- On all storey exits and all exits to open air irrespective of whether they are designated fire exits. Manual Call Points should only be installed on exits leading to the ultimate place of safety.
- Nobody should travel more than 45m to reach one, reduced to 30m if the building layout is unknown at the Design stage.
- In all areas with potential high fire risk such as kitchens etc.
- Where phased evacuation is planned, Manual Call Points will need to be sited on all exits from a particular Zone.
- To be mounted at 1.4m above finished floor level with a mounting tolerance of +200mm/-300mm.
- All Manual Call Points are to be fitted with a protective cover.

Manual Call Points should be fixed at a height of 1.4m above the finished floor level, at an easily accessible, well-illuminated and conspicuous position free from potential obstruction. They should be sited against a contrasting background to assist in easy recognition. A lower mounting height is acceptable in circumstances where there is a high likelihood that the first person to raise an alarm of fire will be a wheelchair user.

Note: The measurement ought to be made between the finished floor level and the centre point of the frangible element.



Manual Call Point

Route of travel 45m max (defined)

Route of travel 30m max (unknown at design stage)

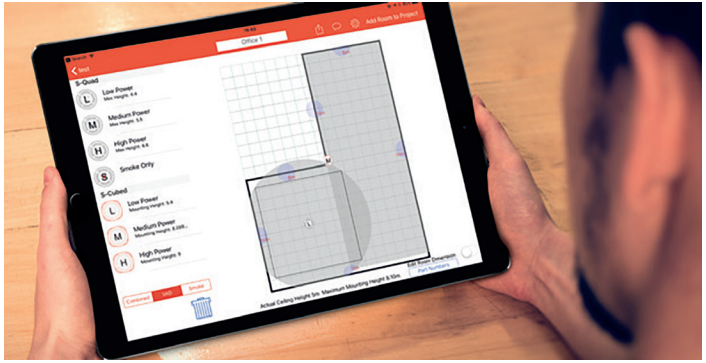
DESIGN STAGE 4

Selection and siting of Sensors

For further advice please refer to clause 21 of BS 5839-1:2025.

The objective is to select the correct Sensor for the appropriate application, to provide the earliest warning of fire without the risk of a false alarm.

It is therefore worth trying to visualise the type of fire that is likely to occur in a particular room or area and also to familiarise oneself with the application and the risks that could give rise to a false alarm.

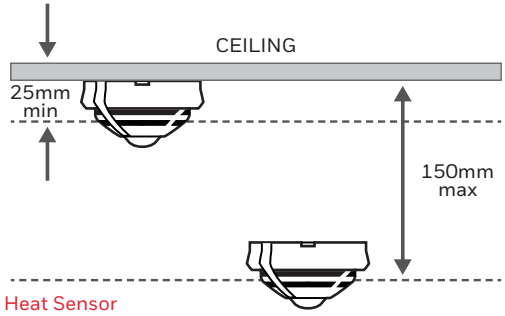


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DESIGN STAGE 4

Heat Sensors complying to BS EN 54-5

Siting of Heat Sensors
(distance from ceiling)



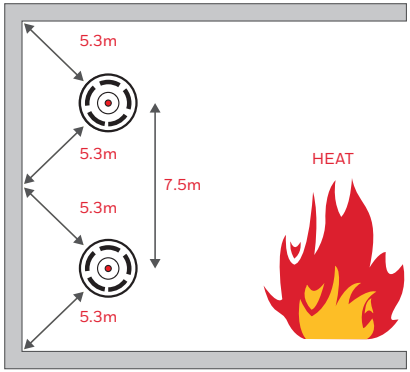
DESIGN STAGE 4

Smoke Sensors complying to BS EN 54-7

Traditionally, 'point type' Smoke Sensors have fallen into two main categories: Optical Sensors and Ionisation Sensors.

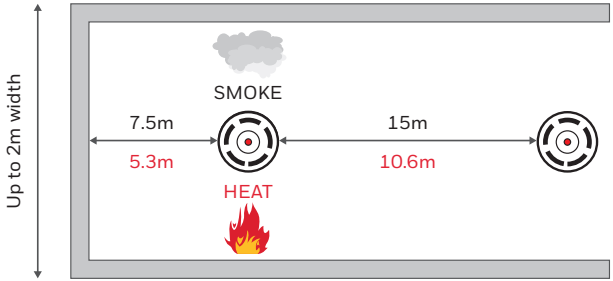
Due to new European Directives for the storage and transport of radioactive sources, Ionisation Sensors are becoming less favourable and are being replaced by Multi-Sensors that utilise single or dual optical chambers that are also combined with heat and/or carbon monoxide sensing elements. This creates a whole range of Sensors that are suitable for detecting different types of fires and yet ignore signals that previously have led to false alarms such as white dust or steam.

Heat Sensor spacing
(Under flat horizontal ceiling)



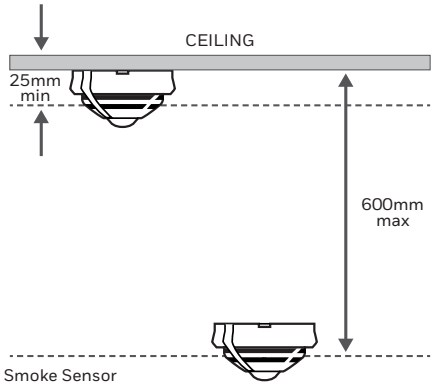
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Heat Sensor spacing in corridors (category P only)
Smoke Sensor spacing in corridors (category L & P)



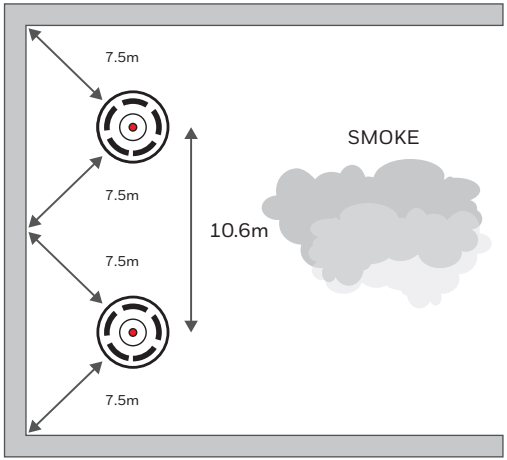
DESIGN STAGE 4

Siting of Smoke Sensors
(distance from ceiling)

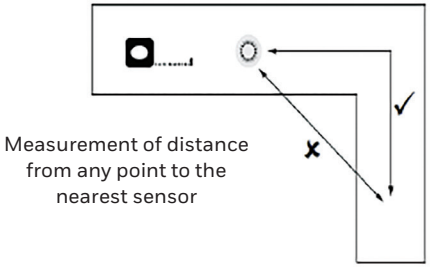


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Smoke Sensor spacing
(Under flat horizontal ceiling)



DESIGN STAGE 4



Sensor Positioning:

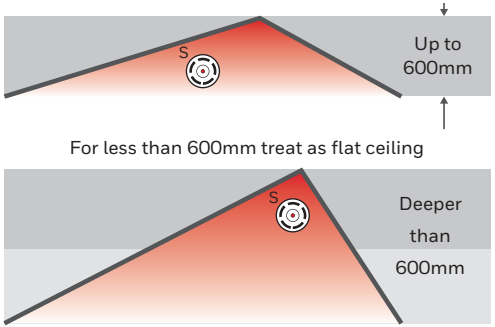
- Smoke Sensor - Still 7.5M
- Heat Sensor - Still 5.3M

Measurement of the distance should be the distance you travel in the physical structure and not the distance between Sensors, as shown above.

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DESIGN STAGE 4

Smoke Sensor under pitched roofs



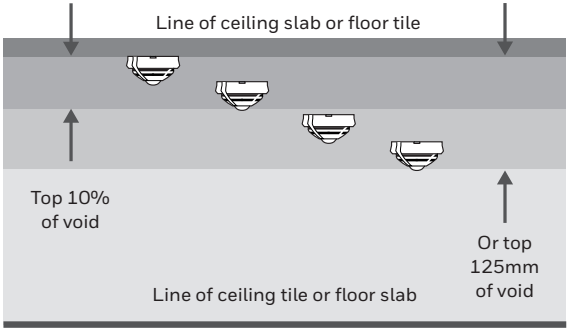
For greater than 600mm at least one row of Sensors should be in the top 600mm. For apex ceilings extend coverage by 1% for each degree of angle up to a maximum of 25%

DESIGN STAGE 4

Mounting Sensors in voids

Applies to floor and ceiling void. Any of the below Sensor positions are acceptable:

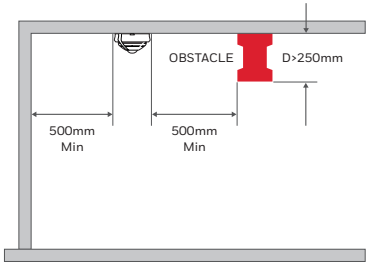
- Voids less than 800mm need not be protected
- Voids over 800mm require protection
- Protection can be omitted through risk assessment but would require a variation

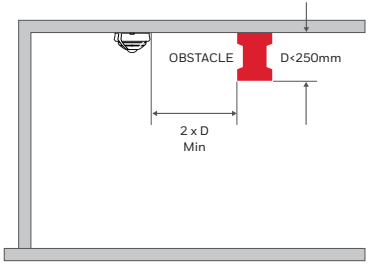


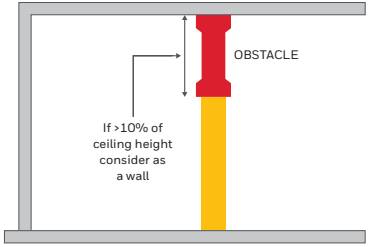
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DESIGN STAGE 4

Limits of siting Sensors near obstacles or walls







DESIGN STAGE 4

Ceilings with multiple joists

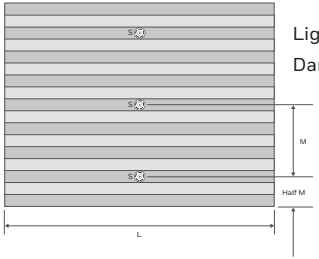
In a room where there are a number of closely spaced structural beams (APPROX 1m or less, centre-to-centre), such as floor joists, the following recommendations should be met:

1- If the longer dimension of the cells is not more than 10.6m for Smoke/ Multi-Sensors, or 7.5m for Heat Sensors, across the shorter cell dimention, the spacing m, between detections should be as detailed in the table below.
The spacing for any detector to the end of the wall should be 0.5m.

All detection must be installed at the centre of the cell.

2- If the longer dimension of the cell is more that 10.6m for Smoke/ Multi-Sensors, or 7.5m for Heat Sensors, then the following must be taken into account:

- The cell should be stopped to the depth of the beam and at no more than 10.6m for Smoke/ Multi-Sensors, or 7.5m for Heat Sensors.
- Detection must be installed in every cell.



Light grey - joists

Darker grey - ceiling slab

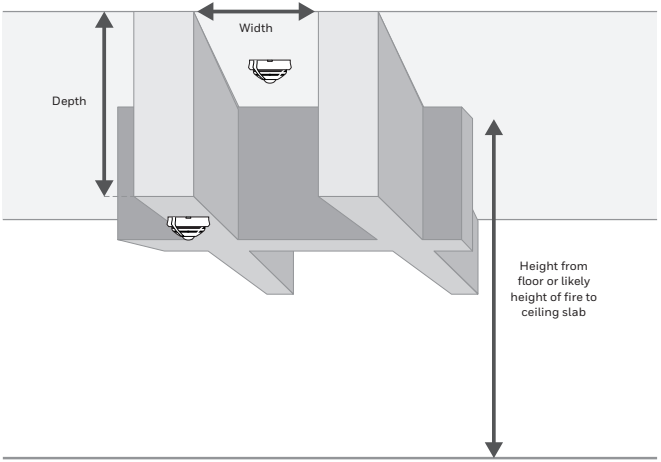
Permitted spacing is detailed in the table below: ratio between ceiling heights vs beam depth and maximum spacing 'm'.

CEILINGS WITH MULTIPLE JOISTS			
Ceiling height (H)	Beam depth (D)	Smoke sensor spacing (M)	Heat sensor spacing (M)
N/A	Less than 10% H	5m	3.8m
3m or less	More than 10% H	2.3m	1.5m
4m	More than 10% H	2.8m	2.0m
5m	More than 10% H	3.0m	2.3m
6m or more	More than 10% H	3.3m	2.5m

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DESIGN STAGE 4

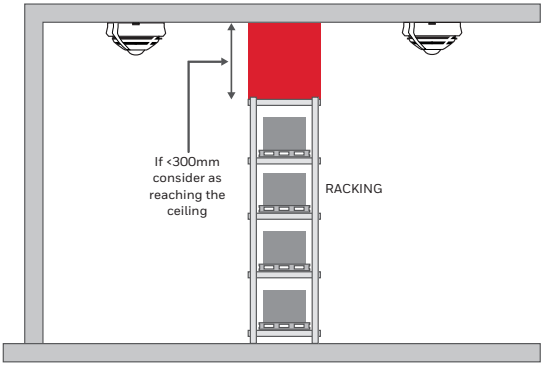
Lattice / Honeycomb Structures



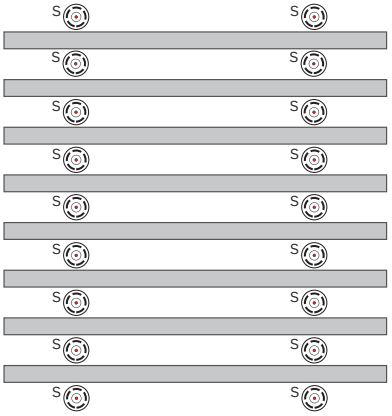
SPACING AND SITING OF SENSORS ON HONEYCOMB AND SIMILAR CEILINGS				
Overall ceiling height from floor into cell H (to nearest whole Metre)	Beam depth, D	Maximum distance between any point and the nearest Smoke or Heat Sensor	Detector location if W is 4D or less	Detector location if W is more than 4D
6m or less	Less than 10% H	As per flat ceilings	Underside of beams	On structural slab in the cell
More than 6m	Less than 10% H and 600mm or less	As per flat ceilings	Underside of beams	On structural slab in the cell
More than 6m	Less than 10% H and more than 600mm	As per flat ceilings	Underside of beams	On structural slab in the cell
3m or less	More than 10% H	4.5m (3m)	Underside of beams	On structural slab in the cell
4m	More than 10% H	5.5 (4m)	Underside of beams	On structural slab in the cell
5m	More than 10% H	6m (4.5m)	Underside of beams	On structural slab in the cell
≥ 6m	More than 10% H	6.5m (5m)	Underside of beams	On structural slab in the cell

DESIGN STAGE 4

Obstructions from floor to ceiling



Ceilings above racking



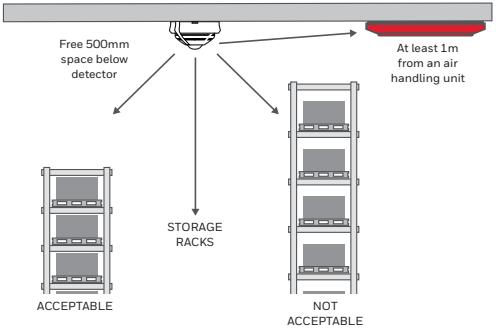
If gap between top of rack and ceiling is less than 300mm then treat as wall and provide detection in each aisle.

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DESIGN STAGE 4

Ceilings with other obstructions or Air Handling units etc.

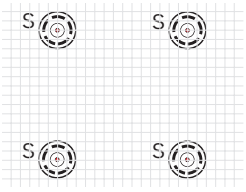
One of the most common mistakes is to mount a Smoke Sensor adjacent to the air conditioning intake or outlet grill. The minimum distance between the two should be at least 1m and further if possible.
This is due to the fact that smoke may have difficulty penetrating the Sensor when the air conditioning is switched on. There is also a greater risk of the Sensor becoming contaminated and giving rise to false alarms.

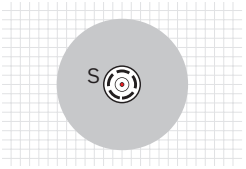


Ceilings with perforations

Sensors above ceilings with perforations can protect the area below subject to the following conditions:

- The perforations are uniform
- The minimum perforation is greater than 10mm
- The thickness of the perforation is less than three times the minimum dimension of the perforation



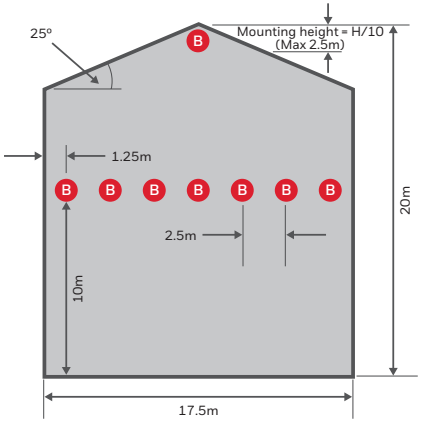


Where air is forced through a perforated ceiling, the Sensor should be mounted on a solid baffle with a minimum diameter of 1200mm

DESIGN STAGE 4

Siting of Beam Sensors

- General rules apply as for Point Sensors
- For apex ceilings, extend coverage by 1% for each degree of angle up to a maximum of 25%
- Maximum distance from the highest point should not exceed 600mm. Where this is not possible (due to physical obstructions in roof space), the maximum distance from the ceiling should be 10% of the ceiling height or 2.5m, whichever is the lowest figure
- Avoid beams close to walls (500mm) or where temporary obstructions may occur
- Mount transmitter and receivers on a solid surface not affected by wind or natural temperature changes
- Additional units may be included in atria to detect at lower levels, to counter stratification effect. The width of the area protected on each side of these beams should be 12.5% of the mounted height



One Beam Sensor covers 18.75m using extra % allowed due to angle of roof.

The gap either side of the Sensor should be 12.5% of the mounting height = 1.25m.

Due to regular obstructions to the apex, smoke detection to cover stratification may be mounted beyond 600mm. Refer to BS 5839-1:2025 (21.4.5).

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LIMITS OF CEILING HEIGHTS (GENERAL)		
Sensor type	Maximum (M)	Up to 10% (M)
Heat Sensor – Class A	9.0	10.5
Heat Sensor – Other Classes	7.5	10.5
Point Smoke Sensors	10.5	12.5
Carbon Monoxide Sensors	10.5	12.5
Optical Beam Smoke Sensors – Normal sensitivity	25.0	28.0
Optical Beam Smoke Sensors – Enhanced sensitivity (alarm at 35% attenuation or less)	40.0 (see Note 1)	43.0 (see Note 1)
Aspirating Smoke Detection – General limit	10.5	12.5
Aspirating Smoke Detection – Class C with at least 5 holes	15.0	18.0
Aspirating Smoke Detection – Class C with at least 15 holes	25.0	28.0
Class B with at least 15 holes	40.0 (see Note 2)	43.0 (see Note 2)

NOTE 1 The use of supplemental detection is recommended [see 21.4.5)] unless the risk (i.e. probability × consequence) of stratification is minimal.

NOTE 2 The use of multi-level sampling is recommended [see 21.6.3)] unless the risk (i.e. probability × consequence) of stratification is minimal.

Choice and siting of Alarm Sounders and Visual Alarms

Sounders and Strobes are generally provided for systems designed to protect life. However, on the rare occasion when only the property is being protected, it is still essential to mount a Sounder adjacent to the Fire Alarm Control Panel as well as immediately outside the main entrance for the fire fighters.

Before deciding on the number and location of Sounders/ Visual Alarms, it is important to establish what the 'Fire Plan' or Cause & Effect will be.

If the building is not going to have a 'one out – all out' arrangement, the evacuation procedures must be established. Once this is known, you can then establish the alarm zone areas where different alarm messages may be given, for example, an alert or an evacuation tone.

DESIGN STAGE 5



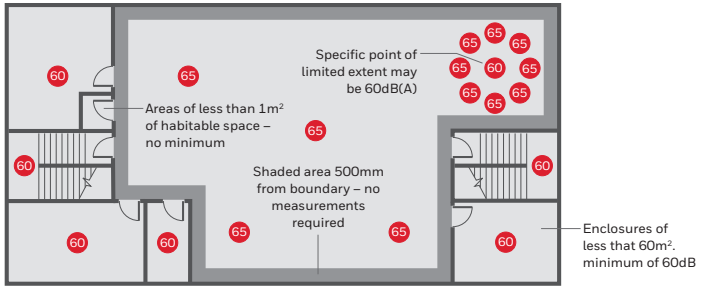
DESIGN TIP 1

Research* over the last twenty years has proven that a Voice-Enhanced Sounder is preferred to a Bell or Electric Sounder as people pay more attention to a spoken message.

* Sources: Brian Piggott (The Fire Research Station) and David Canter (Surrey University)

Audible alarm levels within buildings are generally accepted as 65dB(A) throughout. However, the Standard does accept that in certain locations this can be as low as 60dB(A). This allows some degree of flexibility, although in general the majority of a site must achieve 65dB(A) or greater to be compliant.

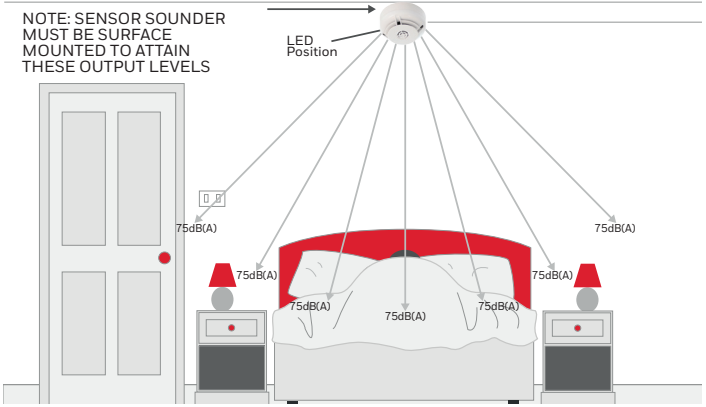
The drawing below illustrates the areas where 60dB(A) is permitted:



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DESIGN STAGE 5

It is maintained that to rouse sleeping persons you need to achieve a minimum of 75dB(A) at the bedhead.



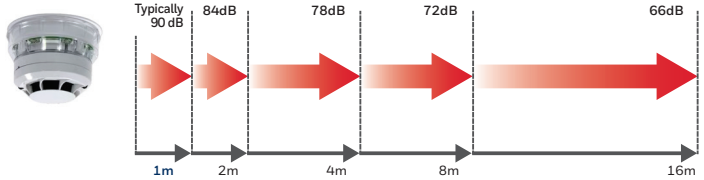
For areas with high ambient background noise levels, the Standard recommends a sound level of 5dB(A) above the norm, although it now goes on to say the maximum sound levels should not exceed 120dB(A) for health and safety reasons. Finally it is essential that at least one Sounder is placed within each fire compartment and the Sounder choice should be common throughout the building. You should not mix Bells and Electronic Sounders within the same building, however, Honeywell offer Bell and Electronic Sounders, allowing a system upgrade or switchover from a bell tone to an electronic tone when required.

Sound attenuation is affected by numerous physical structures within a room, including the door, furniture, people and materials used for floor, walls etc.

General internal doors will attenuate at least 20dB(A), whilst heavier fire doors may well attenuate by up 30dB(A). To ensure 75dB(A) is achieved within a bedroom, it is accepted that the Sounder is mounted within the room rather than the corridor outside. The use of Sensor-Sounders ensures an even spread of sound throughout the building without the need for separate 'louder Sounders'. Visual Alarms are a common method for providing alarm in areas of high background noise. Where these are the primary means of alarm, they must comply to BS EN 54-23.

DESIGN STAGE 5

They may also be used in areas where there is a requirement for slience even in an emergency such as TV studios, operating theatres or where a staff alarm is employed ahead of a general evacuation. The exception could be where sound of any description is undesirable, for example, in operating theatres, TV studios and places of entertainment where a discreet staff alarm system is the best option to avoid panic.



Visual Alarms are also included as a requirement of the Equality Act 2010 (formerly the Disability Discrimination Act 1995) and Approved Document Part M of the Building Regulations and should be included in all sleeping accommodation where people with a hearing disability may be present.



DESIGN STAGE 6

Control equipment and power supplies

The Control Panel itself should comply to BS EN 54-2 and any power supply used should comply to BS EN 54-4. all the Honeywell manufactured Fire Alarm Control Panels incorporate their own battery and charger, and as long as the guidelines for loading these systems are complied with, the batteries should be sufficient to maintain the system for a period of at least 24 hours with half an hour alarm load thereafter.

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It is, however, recommended that a battery load calculation is carried out to verify the standby period provided by the capacity of the battery supplied.Irrespective of the size or type of system, the Fire Alarm Control Panel should be sited with the following points in mind:

- In an area of relatively low fire risk
- On the ground floor entrance, which the fire fighters will use
- In buildings of multiple occupancy, the Panel should be sited within a communal area, or if this does not exist, a location that is accessible at all times
- Where there are ambient light levels, ensure visibility at all times
- Fire zonal indication should be clearly displayed by a Light Emitting Indicator or an illuminated mimic diagram – it is not acceptable to simply accept the information from an LCD or VDU display



If there are several entrances to the building, consideration should be given to the provision of repeat indicators.

The Installer's responsibilities:

To install all equipment in accordance with the Standards

- To use the correct types of cable
- To test the cables, continuity and earth, and provide certificates
- To flag up any Variations that affect the Design
- To produce a set of 'as fitted' drawings
- To sign off the Installation Certificate

Types of cable and where to use them

There are two basic grades of cable permitted for use on fire alarm systems. These are known as Standard Grade and Enhanced Grade designed to meet the Standard, BS EN 50200:2015

The choice of cable needed is dependent on how long the cable is expected to continue to operate whilst a fire is occurring.

The integrity of the system is paramount and all interconnections between devices must be considered - especially those that affect the signals' critical path.

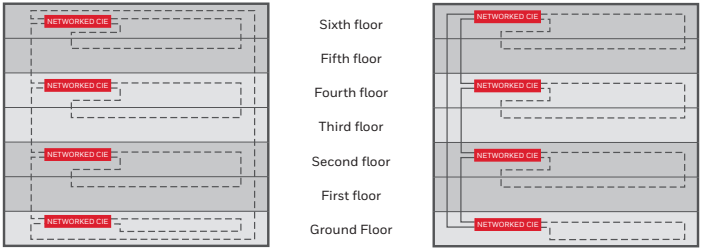
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DESIGN STAGE 6

What cable? – Standard or Enhanced fire resistant cables?

The Standard fire resistant cable will satisfy most applications, particularly with 'one out - all out' fire plans. Enhanced fire resistant cables are required for applications that need communications to continue during a fire incident when the building fabric may be destroyed. Examples of where Enhanced fire resistant cables should be used include:

- In un-sprinklered buildings where the 'Fire Plan' involves the evacuation of occupants in four or more phases
- In un-sprinklered buildings greater than 30m in height
- In un-sprinklered buildings or large networked sites where a fire could affect the cable's 'critical path', particularly where people will remain in occupation during a fire elsewhere on the site
- Where in part, a delayed evacuation may exist and the critical signal path may pass through an area of high risk
- Where a Risk Assessment has identified a particular need for an Enhanced cable



Example of a networked fire alarm in a multi-storey building, showing standard cable grade throughout, provided that there is diverse routing of the network cable loop.

Example of a networked fire alarm in a multi-storey building, showing standard cable grade for local wiring and enhanced grade for the network cable.

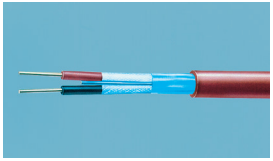
Other aspects in regards to Installation practice

The electrical characteristics of the cable, such as impedance, capacitance etc. should be capable of handling the data and power of the system.

Honeywell regularly updates the list of approved Standard and Enhanced cables used for loops or networks. We would suggest you obtain the latest copy of our Installation Manuals or contact your local Systems Integrator to obtain the latest approved products.

Cable requirements

- Core size not less than 1.5mm
- Where exposed cables are below 2m, additional mechanical protection should be considered
- The colour of the outer sheath should preferably be RED, although other colours are permitted as long as it is common throughout the building and does not clash with any other electrical services



Fire cables should:

- Be segregated from all other services
- Not share the same conduit
- Use a separate compartment if common trunking is used
- Avoid running alongside high current power lines
- Avoid running adjacent to lightning conductors
- Avoid electro magnetic interference from other circuits

The Standard precludes the use of a multicore cable where a single fault will cause more than one circuit to fail. This is particularly true with loop-wired systems where communication from either end is required and the failure of a 4-core cable will mean that all communication is lost.

- Cable joints should be avoided, other than the components themselves
- Cable support should withstand the same temperature as the cable, which method the use of plastic cable clips, cable ties or trunking, where this is the main means of supporting the cable, should NOT be used
- Cables should not rely on suspended ceilings for their support
- Mains power supplies should also be wired back to the main circuit breaker in fire resistant cable

Recommendations for the mains power supplies circuit breaker taken from the load side of the buildings main isolating device

To facilitate local isolation during maintenance, suitable means should be provided for double pole isolation of the low voltage supply circuit that serves the power supply and control equipment.

This circuit breaker can incorporate a switch if necessary, but in either event should be labelled 'FIRE ALARMS – DO NOT SWITCH OFF' – this supply should be used for the sole purpose of the fire alarm system.

In large multiple occupancy buildings, it may be necessary to obtain a mains supply via a mains distribution board. However, the same arrangements as above apply. The isolation of this local distribution board and the fire isolating device is a minimal requirement and should be inaccessible to unauthorised persons.

Ideally the supply should not be protected by a residual current device unless necessary to comply with requirements of BS 7671. If this is the case then it should not be capable of isolating the mains supply to the fire alarm system.

Inspection and testing of wiring

Prior to any equipment being connected, all installed cables should be subject to a 500V DC insulation test.

These tests should show an insulation value of at least 2M Ohms between conductors and between each conductor and screen or earth.

Earth continuity test should be carried out on all mains supply circuits as well as an earth loop impedance in accordance with BS 7671.

The maximum impedance of each loop or radial circuit should be recorded to ensure it meets the manufacturers recommendations.

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SYSTEM COMMISSIONING

Commissioning Engineer's responsibilities:

- Functional testing of all equipment
- Confirm fire plan or Cause & Effect is correct as per the Design
- Look for any incorrect positioning of Sensors or other Devices – snag them or list them as Variations
- Record sound-level meter readings
- Provide a logbook and product manuals
- Carry out staff training
- Collate all documents including:
  - Design Certificate
  - Installation Certificate
  - Commissioning Certificate (also sign it!)
  - Cable test and wiring certificate
  - Specification and drawings
  - List of agreed Variations
  - Fire Plan or 'Cause & Effect'
  - Acceptance Certificate signed by clients representative

It is important that the system is commissioned by a competent person who has attended recognised training courses on the equipment as well as the British Standard.

At this stage the entire system should be Tested and Inspected. In particular:

- Every Manual Call Point, Sensor, Sounder, Interface and Indicator
- Check that all devices are correctly sited to cover the area they are intended to protect – see previous notes on siting of Devices
- Check that all devices are correctly labelled and display the correct information on the Fire Alarm Control Panels
- All sound pressure levels should be measured and recorded
- Any transmission of signals to remote centres or equipment should be proven
- The 'Fire Plan' or Cause & Effect should be checked from every Device
- All Fire Alarm Control Panels and printers display the correct information and are sited correctly
- A suitable diagrammatic Zone Plan is mounted adjacent to the Fire Alarm Control Panel
- No changes to the building have affected the siting of equipment or effectiveness of the system. For example, an additional partition requiring additional Sensors
- Mains and standby power supplies are adequate and designed to support the system for a specified period. For example, 24, 48 or 72 hours
- As far as reasonable, ascertain that the installation complies with the Standard and certificates are provided by the installer
- If radio equipment is used, ensure all radio signals are of sufficient strength to ensure reliability
- Ensure there are no obvious shortcomings with the system as a whole and that all the documentation is correct

It is also recommended that the system is soak tested for up to a week, dependent on the system size, so that any teething problems are identified without giving rise to any false alarms.

END-USERS RESPONSIBILITIES

BS 5839-1:2025, Section 4 recommends the following responsibilities for End-Users:

- Ensuring that the CIE is checked at least once every 24h to confirm that there are no faults on the system
- Ensuring that arrangements are in place for testing and maintenance of the system
- Ensuring that the system logbook is kept up-to-date and is available for inspection by any authorised person
- Ensuring that all relevant occupants of the protected premises are instructed in the proper use of the system
- Ensuring that appropriate action is taken to limit the rate of false alarms
- Ensuring that a clear space of at least 500mm is preserved in all directions around and below every fire detector, and that all Manual Call Points remain unobstructed and conspicuous

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SUMMARY

1) CATEGORIES OF SYSTEMS

There has been a changes made to the following system categories

a) L2 systems with sleeping risk are now categorized as HIGH RISK and require protection. Therefore HEAT DETECTION is no longer permitted to be used in such rooms.

b) Stairway lobbies are now designated as areas requiring detection

c) L4 Systems with flue-like structures now require a Detector at the top. However, the new definition does not recommend a Detector be placed within 1.5m of the penetration on every floor

2) VARIATIONS

As BS 5839-1:2025 is a Code of Practice and variations against said recommendations are allowed, it is now recognised that the following departures from BS 5839-1:2025 are deemed 'detrimental to the safety of life' and as such should NOT be regarded as acceptable:

a) The absence of a ZONE PLAN in premises of more than 1 Zone or 1 Storey, especially in building containing sleeping risks.

b) The absence of a facility to transmit fire alarm signals to an Alarm Receiving Centre.

3) PLACEMENT OF INTERFACES

a) For all systems and categories, all fire system interfaces should be accessible for maintenance purposes.

4) OBSTACLES TO DETECTORS

As more obstacles on or near ceiling become more common in buildings, further consideration has been given to assist installers with this issue:

Where the obstruction, such as ducting has been installed close to the ceiling, this should be treated as a wall if:

i) the gap between the top of the obstruction and ceiling is less the 300mm **and**
ii) the obstruction is greater than 10% of the overall ceiling height (measured from FFL).

5) MANUAL CALL POINTS

There has been some subtle changes to the distance of travel for Manual Call Points, which has now been simplified to 30m of travel in a straight line or 45m of actual travel distance.
Mounting height of the MCP has been kept the same at 1.4m FFL, but the mounting tolerance has been clarified at +200mm higher or -300mm lower. Protective covers must be installed and be translucent in colour. Enclosed stairwells have been clarified and it now simply states:

a) If a Manual Call Point is located on the landings of a stairway, the MCP on each level, other than the FINAL EXIT LEVEL should be incorporated within the Zone that serves the adjacent accommodation on that level.

6) FIRE ALARM TONES

Within BS 5859-1:2017, it was recommended that Fire Alarm Sounders were not used for conflicting warnings. In BS 5839-1:2025, this has been changed to allow the use of the same Fire Alarm Sounders but with different tones/messages than that of the Fire Alarm System. The use of Fire Alarm tones should not be used for any other purpose than the warning of fire except:

a) The response required is identical to that required in the event of a fire

b) In schools where the fire alarm system is used to indicate the start or finish of pre-determined periods, but should not exceed 10 seconds in duration (revised from 5 seconds duration in BS 5839-1:2017)

7) REMOTE INDICATORS

In BS 5839-1:2025 it is now clarified that remote indicators should be RED in colour and should form part of the routine inspection to confirm correct operation and location.

8) ALARM TRANSMISSION

Clarification has now been given concerning the details of timings of any signals received at the alarm receiving centre (ARC):

a) For any catergory L system, in the event of a fire signal, this should be recieved by the ARC within 90s. A catastrophic failure of the signal transmission system should be reported to the ARC within 3 minutes.

b) For any category P systems, in the event of a fire signal, the signal should be recieved at the ARC within 120s/ A catastrophic failure of the alarm transmission system should be recieved at the ARC within 31 minutes.

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9) USE OF HEAT DETECTION

As there have been changes made to category L2 which now detail the inclusion of early warning to sleeping persons, Heat Detection is no longer permitted in these areas. The same change has been made to L3 systems, however, L3 is primarily designed to protect the room and not the person in the room.

Another clarification on the use of Heat Detection comes in the form of the use of sprinkler heads as Heat Detection. This has previously been acknowledged within BS 5839-1. In BS 5839-1:2025, this has been further recommended that is sprinkler heads are used to initiate a 'Fire Condition' on the Fire Alarm Control Panel, then the indication of sprinkler operations should clearly show the area in which the sprinkler has operated and also show any Fire Detection Zones.

Sprinkler Zones should not overlap more that ONE Fire Zone.

10) CEILING HEIGHTS

The mounting height of Multi-Sensor technology has now been fully clarified within BS 5839-1:2025. If the Multi-Sensor is configured for Heat and Smoke, then the maximum mounting height of the Sensor should be set at the lowest form of detection, so for this example, set at the highest mounting height for a Heat Sensor.

11) DETECTION IN VOIDS

BS 5839-1:2025 now gives clear guidance on the placement of detection within Voids. The placement of the Sensor in the Void is as per dimensions below:

a) Voids of up to 1.25m deep - Sensor mounted in top 125mm

b) Voids between 1.25m and 1.5m deep - Sensor mounted in top 10% of the height

c) Voids of more than 1.5m should be treated as a normal height room

i) Smoke Sensor mounted at 0-600mm from ceiling

ii) Heat Sensor mounted at 0-150mm from ceiling

12) FALSE ALARM MANAGEMENT

Section 3 of BS 5839-1:2025 Limitation of False Alarms has now been reorganised to one section containing multiple clauses. These include:

- Clause 29 - Responsibility for limitation of false alarms
- Clause 30 - Categories and causes of false alarms
- Clause 31 - Investigation of false alarms
- Clause 32 - The Design process for limitation of false alarms
- Clause 33 - Measures to limit false alarms

BS 5839-1:2025 also recommends that all false alarms must be investigated by the End-User and the commissioning/handover company should provide full information on how to carry out such investigations.

BS 5839-12:2025 places more emphasis on the selection and installation of Multi-Sensors over point type Smoke Sensors where the threat of increased false alarm is present.

New guidance is given with regards to investigation of false alarms based on the number of Sensors installed. This is now recommended as:

a) A preliminary investigation is required if more than 4 false alarms are recored per 100 Sensors over the previous 12 month period.

b) An in-depth investigation is required if the false alarm rate exceeds 5 false alarms per annum on systems of 40 Sensors or more.

13) DOCUMENTATION

There has been a change within BS 5839-1:2025 that now recommends that the End-User has a Cause & Effect matrix or text document of how the Systems' Cause & Effect works. This should be provided alongside the documentation that is required at final handover of system to the End-User.

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14) MAINTENANCE

There has been a change to BS 5839-1:2025 to bring the Standard more in line with current practice with maintenance visits set at 6 month periods, but acceptable to be carried out at 5 or 7 month periods.

The Standard now removes the clause from BS 5839-1:2017 that stated that if the system was not maintained every 6 months, then the system would be non-compliant. BS 5839-1:2025 now contains recommendations for systems connected with IP or digital connection to CIE with a new clause contained within (43.4). There are recommendations for preventing unauthorised access to the system, any IP access points and network pathways by any physical means (locking of cabinet). There are also recommendations for the remote connection to have a method of authentication to request a remote connection.

A risk assessment should be undertaken by the maintenance company prior to using remote access, especially with control functions to fully evaluate any potential impact of the operation of the Fire Alarm System.

15) FAULT REPAIR

BS 5839-1:2025 now states that if a fault has been reported by the End-User to the service company, and the fault cannot be repaired, then fault indications should not be concealed (ie: masking the fault with suppression).

16) MODIFICATIONS TO EXISTING SYSTEMS

BS 5839-1:2025 section 7 now details the requirements of upgrading an existing Fire Alarm System. Some changes to the Standard are:

- Update of Control Panel Firmware is now listed as a modification, and as such, requires a modification certificate to be produced.
- New works carried out will require to be installed as per BS 5839-1:2025 and certificated via a modification certificate.
- When upgrading to an existing system necessitates that existing Devices become redundant, then to avoid confusion, these Devices should be removed.

17) LOGBOOK

BS 5839-1:2025 now recommends that all variations are recorded in the logbook. Information on this change is in Annex H.

18) ANNEXES

The annex section of BS 5839-1:2025 has now been re-ordered, so that they are now listed in the order in which they appear in the Standard.

19) BATTERY ALARM PERIOD

There has been a change in the Standard to bring BS 5839-1:2025 in line with other BS 5839 Standards, in that the battery alarm period is calculated by the T2 formula, replacing the previous method of dividing by 2.

20) FALSE ALARM RATE CALCULATION

Within BS 5839-1:2025, there is a new Annex F, which now provides a new calculation rate for false alarms. This is:

$$A_{fr} = 100 \left(\frac{A_{fn}}{D_{AF}}\right)$$

Afr = False Alarm Rate

Afn = No of False Alarms

Daf = No of Detectors

Annex F also shows multiple examples of False Alarm calculations, along with type of investigation required, either preliminary or in-depth.

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HONEYWELL – A GUIDE TO BS 5839-1:2025

HONEYWELL FIRE IN THE UK & I

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