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Queries and interpretations on BS 5839-1

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Foreword

Publishing information

This Published Document is published by BSI and came into effect on 30 October 2010. It was prepared by Subcommittee FSH/12/1, *Installation and servicing*, under the authority of Technical Committee FSH/12, *Fire detection and alarm services*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This Published Document supersedes PD 6531:1997, which is withdrawn.

Relationship with other publications

Since the publication of BS 5839-1, a number of queries on interpretation have been submitted to BSI. In some cases, the queries have shown that although the standard is correct, misunderstandings have arisen over both its interpretation and the philosophies behind its recommendations.

This document, therefore, gives not merely the queries and answers, but seeks to give the intentions of the standard in the hope that these might help future users of the standard.

Information about this document

This Published Document gives supplementary information on the recommendations and application of BS 5839-1:2002+A2; it does not in any way supersede the recommendations in BS 5839-1. Any user claiming compliance with BS 5839-1 is expected to be able to justify any course of action that deviates from its recommendations.

Unless stated otherwise, all clause and subclause references in this Published Document are to BS 5839-1:2002+A2.

This is a full revision of the Published Document and all queries and answers have been revised in line with BS 5839-1:2002+A2. All queries and answers relating to BS 5839-4 have been removed, as this standard has been withdrawn and superseded by BS EN 54-2 and BS EN 54-4.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a Published Document cannot confer immunity from legal obligations.

1 Scope

This Published Document gives queries concerning the interpretation of BS 5839-1:2002+A2, together with the relevant answers.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 5839-1:2002+A2:2008, *Fire detection and fire alarm systems for buildings – Part 1: Code of practice for system design, installation, commissioning and maintenance*

BS 7671:2008, *Requirements for electrical installations – IEE Wiring Regulations – Seventeenth edition*

3 Queries and interpretations on BS 5839-1:2002+A2

3.1 The use of isolators between zones

Query

BS 5839-1:2002+A2, **12.2.2**, sets limitations as to the effect of a fault or faults in the wiring. What is the philosophy behind these limitations? Why are the areas limited by a fault for addressable systems not identical to the zones for non-addressable systems?

Answer

The commentary to Clause **13** describes that zones should be small enough for the source of the fire to be quickly located. The recommended limit to the area of a non-addressable or addressable zone with automatic fire detection is given in **13.2.3**a) and **13.2.4**b) as 2 000 m^2. A zone should also be limited to one storey for buildings larger than 300 m^2.

Clause **12** includes the recommendations for system integrity. Subclause **12.2.2** recommends that a single short circuit or open circuit fault on an automatic fire detector circuit should disable protection neither within an area of more than 2 000 m^2, nor on more than one floor of the building plus a maximum of five devices (automatic detection, manual call points, sounders or a combination of these) on the floor immediately above and five devices on the floor immediately below that floor.

For a non-addressable system, and for an addressable system wired with a radial circuit for each zone, each circuit is dedicated to an individual zone, so the area limit for a zone would be identical to the area limit for system integrity (generally up to 2 000 m^2).

For a loop wired addressable system, the area limits for zones and for system integrity need not be identical. A zone is limited to an area of 2 000 m^2, and system integrity also limits the area affected by a fault to 2 000 m^2. However, they need not be the identical 2 000 m^2 areas. Up to five devices on the floor above and up to five devices on the floor below may be included in the 2 000 m^2 area for system

integrity. For loop wired systems, the integrity for short circuit faults would be achieved using short circuit isolators, such that the area protected between isolators did not exceed 2000 m^2.

The five devices above and below were included so that the designer did not necessarily have to site the isolators exactly at the zone boundaries and to help expedite work at the installation stage so that if a void or riser not known to the designer were found, then it could be covered using some of these five devices.

It can be seen that for loop systems some flexibility is permitted. Where a storey is protected by just one zone, the flexibility would be the five devices above and below. Where a storey is larger than 2000 m^2, it would be protected by more than one zone of 2000 m^2 and more than one integrity area, also of 2000 m^2. The integrity areas in this case, providing they are within the 2000 m^2, need not be within the five devices or the zone boundaries.

3.2 Optical beam detectors in congested roof spaces

Query

We have a large warehouse with a series of bays, each having a shallow pitched roof. The warehouse is protected by optical beam smoke detectors, the beams passing close above the trusses supporting the roof. There is a high rate of false alarms (possibly due to birds perching in the beams) and our installers have recommended mounting the detectors so that the beams pass below the trusses. The beams will then be 1.8 m below the underside of the roof, although BS 5839:2002+A2, **22.3**d), recommends that, for smoke detectors, this distance should not exceed 600 mm. Subclause **22.5**c) states that the recommendations of **22.3**d) apply. What should we do? The apex of the roof is 15 m above the ground, the eaves are 13 m above the ground and the bays are 25 m wide.

Answer

The revised system would not conform strictly to the standard, but this might be a case in which a variation from the standard should be considered. In a building of this type, the smoke usually rises into the apex of the roof, and then gradually builds downwards until it can pass under the valley of the roof into the next bay. It could be that detection beams at valley level would be satisfactory, since detection would occur while the smoke is restricted to one bay.

However, these beams would not be able to detect fires starting within the roof apex. If the apex contains fuel and ignition sources (such as electrical or mechanical equipment), it is important that detection facilities are placed higher than any potential fire.

3.3 Detectors in lift shafts

Query

BS 5839-1 recommends the provision of detectors within lift shafts. These can be difficult to install, particularly retrospectively, and give problems of ongoing maintenance. Under the circumstances, given the difficulties that provision creates, is it really necessary to install detectors within lift shafts?

Answer

The Committee acknowledges the difficulties described in the question. The original intention behind the provision of detectors within lift shafts in earlier editions of BS 5839-1 was to give warning of a fire within the lift shaft itself. A subsidiary benefit is to warn those responding to a fire that smoke from a fire outside the lift shaft is spreading vertically via the lift shaft.

Because of the difficulties described, when BS 5839-1 was revised in 2002, consideration was given to the possibility of omitting detectors from lift shafts. Accordingly, research was carried out into the frequency with which fires actually occur within the lift shaft itself. This research revealed that a significant number of fires still occur in lift shafts each year (according to statistics based on fire report forms completed by fire and rescue services). These appear to be caused by the build-up of detritus in the base of the shaft.

The Committee did introduce a relaxation whereby, for compliance with BS 5839-1, these detectors are not necessary in Category L4, L5 and P2 systems, although the standard does suggest that in the case of category L5 and P2 systems, the need for the provision of these detectors, over and above the detection necessary for compliance with the standard, should be considered at the design stage.

It should also be noted that BS 5839-1 is a Code of Practice. If it is considered (e.g. on the basis of a risk assessment) that, in any category of system, detection within lift shafts is unnecessary, a variation, whereby the detectors are omitted, may be agreed within the interested parties.

Where detection is necessary, forms of detection, other than point detection, could be considered (e.g. an aspirating system), or it might be possible for there to be an arrangement whereby the detector could be removed for maintenance from a position above the lift shaft, without the need for entry to the shaft.

3.4 Diagrammatic representation of the building/zone plan

Query

Other than in small buildings, where, arguably, a zone plan is less important, most modern fire alarms are of the addressable type, so that a clear text description of the location of a fire can be given. Under these circumstances, is there a need for a zone plan to be available in close proximity to the control panel?

Answer

The Committee has given consideration to the need for both zonal indicators and zone plans on more than one occasion since the advent of addressable systems. In considering the question, it should be noted that there is a clear relationship between the provision of zonal indicators and a zone plan, since the zonal indicators will be of little value without a diagrammatic representation of the building, showing its sub-division into detection zones.

The Committee is cognizant of the benefits afforded by an addressable system and its associated text display, particularly for those familiar with the premises and the operation of the fire alarm control and indicating equipment (CIE). However, at the time of a fire, the building might be

unoccupied, or those present (e.g. a contract security officer) might not be fully familiar with the building and designations given to areas or rooms within it. The Committee considers that zonal indicators provide immediate, at-a-glance information to those responding to an alarm signal, particularly firefighters, regarding the area to which firefighters should be dispatched.

The plan of the building is then extremely useful for firefighters in the orientation and determination of the best route to the detection zone of fire origin. Moreover, zonal indicators and the associated zone plan can provide firefighters with information regarding spread of fire, which might not be as readily obvious from scrolling through text information regarding detectors in the alarm condition, a process that would, in any case, prove difficult for those unfamiliar with the fire alarm CIE.

Notwithstanding the above, in subdividing a building into detection zones, the need to apply the search distance criterion is relaxed in the case of an addressable system in which the text display shows the location of the first detector to initiate an alarm signal (as this is the most likely location of the fire), but this relaxation only applies where the text information can be readily related to the associated zone plan, so that, again, firefighters can proceed directly to the exact location of the fire.

3.5 Use of a 500 volt insulation resistance meter every five years

Query

I have been told that all electrical circuitry needs to be checked with an insulation resistance tester every five years. This would require the removal of every field device.

Answer

There is nothing in BS 5839 that recommends such action. Furthermore, the current (seventeenth) edition of BS 7671, the IEE Wiring Regulations, makes it clear that the periodicity between inspections of electrical installations is a matter of assessment by the inspector. Dismantling of the system is to be avoided. Fire Alarm final extra low voltage (ELV) circuits from the CIE are all wired in fire resisting cable which is continuously monitored for faults by the CIE. The low voltage (LV) mains cabling is not continuously monitored and has to be assessed as part of the general electrical installation.

3.6 Time delays used with conventional control and indicating equipment (CIE)

Query

The Chief Fire Officers' Association (CFOA) *Policy for the reduction of false alarms and unwanted fire signals* [1] recommends that steps should be taken to limit transmission of false alarms to the Fire and Rescue Service by on-site call filtering, such as inclusion of an automatic time delay before the alarm signal is transmitted. How can I implement this recommendation on a conventional fire detection and alarm system and still comply with BS 5839-1:2002+A2, **35.2.7**, which recommends that filtering should not be applied to signals initiated by manual call points?

Answer

The recommendation from CFOA is usually achievable in an addressable system which incorporates built-in timers and is able to identify each alarm point individually. However, in most conventional systems, it is not possible to distinguish between alarm signals initiated by automatic fire detectors and those initiated by manual call points. In such systems, automatic time delay before transmitting an alarm signal to the Fire Rescue and Service cannot be implemented within the recommendations of BS 5839-1 and alternative methods of limiting unwanted fire signals need to be used.

It should be noted that delaying the transmission of alarm signals is only a means of filtering out unwanted fire alarm signals, rather than obviating their cause. It is therefore important that, irrespective of filtering out alarm signals, other measures designed to limit false alarms and increase overall fire safety are considered. In particular, BS 5839-1:2002+A2, **35.2**, gives a range of recommendations for the limitation of false alarms, which can be implemented independently of the type of fire detection and alarm system used. These address, for example, the selection and siting of automatic fire detectors and manual call points, protection against electromagnetic interference, performance monitoring of newly commissioned systems and system management.

The implementation of measures to limit false alarms, as recommended in BS 5839-1:2002+A2, normally goes a long way in suppressing the causes of false alarms and, hence, reducing the transmission of unwanted fire alarm signals to the Fire and Rescue Service. This is particularly significant for small to medium conventional systems which generally do not need time delay filtering to meet the objectives of the CFOA Policy.

3.7 Manual call points (MCPs) and exits to open air/place of safety

Query

BS 5839:2002+A2, **20.2**c), states that MCPs should be provided at all exits to open air. Does this mean that every external door leading from the building requires an MCP?

Answer

In the event of an evacuation signal, people should evacuate the building via an exit that leads to a place of ultimate safety, that is, a place in which there is no immediate or future danger of fire.

To comply with BS 5839-1:2002+A2, MCPs should be sited adjacent to all storey exits and exits to open air that lead to a place of ultimate safety.

Therefore, if, for example, a door leads to an enclosed courtyard that is in the open air but has no exit to a place of ultimate safety, this door would not need to be provided with an MCP as the provision of an MCP at this point could infer that the door leads to a place of safety. Moreover, to escape, people would need to re-enter the building and would therefore be afforded an opportunity to operate the fire alarm system on their route to a suitable exit. Similarly, the same would apply to a door leading to a flat roofed area from which there is no suitable means of escape (e.g. external escape stairway).

The question is also often asked regarding the provision of MCPs adjacent to roller shutter doors and similar exits to open air that are not specifically designed as, or designated, fire exits. There are two scenarios to consider.

a) If the roller shutter or similar exit can be used as a means of safe egress from the premises to a place of ultimate safety, an MCP should be provided adjacent to the roller shutter because in the event of a fire, people in the vicinity of the roller shutter are more likely to leave the premises via the roller shutter rather than a designated fire exit or normal egress door.

b) If the roller shutter cannot be used as a means of safe egress from the premises to a place of ultimate safety, MCPs might not need to be provided.

3.8 Houses in multiple occupation (HMOs): the relationship between BS 5839-1 and BS 5839-6

Query

I have received conflicting advice from fire alarm installers and different enforcing authorities across the country as to whether BS 5839-1 or BS 5839-6 should be used for houses in multiple occupation. I am also confused as to the difference in the nature of the protection afforded by each Code of Practice, as compliance with BS 5839-1 appears to be significantly more expensive than compliance with BS 5839-6.

Answer

HMOs take many different forms, and the Committee is aware that, across the United Kingdom, different enforcing authorities take differing views on this matter. There are also numerous guidance documents that support relevant legislation in respect of fire safety in HMOs which have to be taken into account.

As a result of this, care should be taken to ensure that the system conforms to the relevant requirements of enforcing authorities, with whom there should be consultation in the event of doubt. However, the answer here relates specifically to interpretation of BS 5839-1 and BS 5839-6, the recommendations of which are sometimes varied (increased or decreased) by enforcing authorities.

HMOs that are hostel-type accommodation are quite straightforward. The view of the Committee is that hostels are little different from hotels. Accordingly, the relevant British Standard is BS 5839-1.

BS 5839-6 applies to dwellings, and the scope of the dwellings addressed includes HMOs that are divided into units of self-contained accommodation, such as bedsits, and houses that have been converted into flats (although, if such a conversion was carried out under recent building regulations, the enforcing authority might not regard the property as an HMO).

A shared house, such as one occupied by a number of students, might constitute an HMO under relevant legislation (depending on the number of students accommodated and the manner in which they live). However, for the purpose of BS 5839-6, the recommendations for fire detection in a shared house occupied by no more than six persons, generally living together as a single family, are those applicable to a single family dwelling.

Where the premises are an HMO of no more than two storeys, with no floor greater than 200 m^2 in area, BS 5839-6 recommends protection in the form of interlinked domestic-type smoke alarms. These are cheaper to install than a BS 5839-1 system, as there is no CIE, and cable does not need to be fire resisting. (Some enforcing authorities extend the scope of this type of system, permitting the use of smoke alarms in HMOs larger than specified here.)

However, BS 5839-6:2004 recommends a Grade A system for HMOs larger than specified here. This system is, effectively, an almost identical system to that necessary for full compliance with BS 5839-1, incorporating the provision of CIE, fire resisting cable, etc. It is simply that there are minor relaxations from BS 5839-1.

Equally, the recommendations of BS 5839-6:2004 for a Grade A system are more onerous than the recommendations of BS 5839-1 in respect of standby power supplies. BS 5839-6 recommends a battery capacity of 72 hours (often requiring a separate power supply unit), whereas, for category L systems, BS 5839-1 recommends only a 24-hour standby supply.

In view of the complexity of the situation described here, the need for early consideration of the appropriate legislation, the guidance that supports that legislation and the view of the relevant enforcing authorities at the design stage is clearly evident.

3.9 Inner room detection

Query

An inner room is a room from which escape is possible only by passing through another room, known as an access room. If the access room is located off a corridor, then it will be protected with automatic fire detectors (AFDs) in the case of a Category L2 or L3 system. However, I am not certain how to protect the inner room. I think that because it opens onto the escape route, it should be protected with AFDs. Is this a correct interpretation?

Answer

No, AFDs would not be required in the inner room. The inner room does not open onto the escape route corridor; therefore it would not need to be protected as part of an L3 system. However, if it were a system to Category L1, then protection would be recommended in the inner room. BS 5839-1:2002+A2, **8.2**c), refers to Category L3 and L4 systems recommending protection of escape stairways, escape corridors and common escape routes. Subclause **8.2**d) for Category L3 systems recommends protection in rooms opening onto the areas listed in **8.2**c). An access room would not normally fit any of these descriptions in **8.2**c), so protection would not be necessary in the inner room for a Category L3 system, even though it opens onto the access room.

As an additional comment, the Committee observes that it will not always be necessary to protect the access room. For example, recognized advice on means of escape from fire permits a vision panel between an inner room and an access room as an alternative to detection in the access room.

3.10 Cables between fire alarm control panels and repeater/mimic panels

Query

Is the cable between a fire alarm control panel and a repeater/mimic panel classed as a critical signal path? If so, does it need to be installed in fire resisting cable?

Answer

BS 5839-1:2002+A2, **3.13**, defines the critical signal path as "all components and interconnections between every fire alarm initiation point (manual call point or automatic fire detector) and the input terminals on, or within, each fire alarm device". Strictly, a mimic or repeater is not in such a path.

Whether a mimic or repeater should be wired in a fire resisting cable depends on whether its use forms part of the fire strategy for the building. If it is critical to the fire strategy, clearly it has to continue to operate in the event of fire, particularly as this equipment is often provided for use by the Fire and Rescue Service at alternative entrance points to a large complex, such as a shopping centre. This principle is implied in the second paragraph of **26.1**, but as that paragraph is commentary, it is not part of the auditable recommendations of BS 5839-1. However, the equipment might form part of the essential components of the system [e.g. to satisfy recommendation **23.2.1**a)]. Under these circumstances, the repeater forms part of the BS 5839-1 system and so the cable to it should be monitored for conformity to **12.2.1**a)8) and should be fire resisting. If the mimic does not form part of the BS 5839-1 system, but is an optional extra, provided in excess of the recommendations of BS 5839-1, the cable would not need to be monitored and would not need to be fire resisting.

3.11 The need for detectors within sterile lobbies and similar areas of low fire hazard in Category L2 and L3 systems

Query

In a Category L1 system, BS 5839-1:2002+A2, **8.2**f), permits detectors to be omitted from certain specified rooms or areas of low fire risk (a term that is defined in the standard). However, no such omission is mentioned in relation to Category L2 or L3 systems. Does this mean that, for compliance with BS 5839-1 for a Category L2 or L3 system, detectors need to be installed in these rooms or areas of low fire risk?

Answer

The Committee did not intend to imply that the omission in question could not be applied to Category L2 and L3 systems. The scheme of system Categories needs to be regarded as hierarchal. The first step in designing a Category L2 system can be regarded as the design of a Category L3 system; then, conceptually, additional detectors are installed in certain rooms (or the type and siting of detectors in certain rooms are modified) to create a Category L2 system. This system then affords a higher standard of protection than the original Category L3 system.

Similarly, conceptually, the protection could be further enhanced by the provision of further detectors in any remaining unprotected areas [other than those specified in **8.2**f)], so creating a Category L1 system,

which affords the highest possible level of protection. It would be anomalous if, in the above concept, to create a Category L1 system, certain detectors, present in the original Category L3 (or Category L2) system, were removed. Accordingly, given that detectors are not necessary in certain areas of low fire risk for compliance with the recommendations applicable to Category L1, they would not be necessary for compliance with the recommendations applicable to Categories L2 and L3.

3.12 Use of intruder alarm system (IAS) subscriber's terminal unit (STU)

Query

Is it permissible under BS 5839-1:2002 to connect the fire detection and alarm system to the intruder alarm system signalling equipment for transmission of fire signals to an alarm receiving centre?

Answer

Theoretically, BS 5839-1:2002+A2 does allow for the use of IAS transmission equipment to convey signals from a fire detection and alarm system to an alarm receiving centre.

However, there is the possibility that many recommendations of BS 5839-1:2002+A2 cannot be satisfied if signalling equipment is shared by the two systems. In particular:

a) certain recommendations of **26.2**. For example, the mains supplies to intruder alarm systems that incorporate the STU should be wired in fire resisting cable, which is segregated from the cables of other services and is readily identifiable by colour; otherwise, a variation would need to be agreed;

b) certain recommendations of **25.2** in respect of mains power supplies. A mains power supply for intruder alarm system signalling equipment should meet all of these recommendations; otherwise, a variation would need to be agreed;

c) certain recommendations of **25.4**. For example, the standby power supply for the intruder alarm signalling equipment should have a minimum of 24 hours standby duration; otherwise, a variation would need to be agreed.

In addition to this, in BS 5839-1:2002+A2, **12.2.1**, there is a recommendation for the indication of various faults to be indicated at the fire alarm CIE if a fault occurs that affects the alarm transmission equipment, e.g. failure of fuses or other protective devices, a short or open circuit in the wiring between the fire alarm CIE and the alarm transmission equipment, mains failure, standby power supply failure and battery charger failure, etc.

The answers here show it might be difficult to avoid variations from the recommendations of BS 5839-1:2002+A2 and it is generally agreed that fire detection and alarm systems should be installed with the minimum number of variations. Therefore, to avoid variations, and for strict compliance with the standard, it might be necessary to equip fire detection and fire alarm systems with their own means of alarm signal transmission independent of other systems. Commercially, this might incur costs that are unacceptable to the user and a compromise in respect of the variations might need to be agreed with interested parties.

3.13 Cable fixings

Query

What are appropriate clipping distances for fire resisting cables?

Answer

BS 5839-1:2002+A2 makes specific reference to recommendations regarding alarm cable installation and support and these are contained in **26.2**f) and **26.2**g), and also Clause **37**, which deals with installation practices and workmanship. It is specifically noted that methods of cable support should be such that circuit integrity of the cable is not compromised. This precludes the use of plastic clips and ties when they are the primary means of support. No recommendations are given for fixing intervals, reliance being made instead on the recommendations of the cable manufacturer. Subclause **37.2**b) recommends that fixings should be secure in accordance with the manufacturer's recommendation and also states specifically that suspended ceilings should not be relied upon for cable support.

Manufacturers of cables typically recommend spacing in accessible positions for fixings at 300 mm for horizontal and 400 mm for vertical installations employing cables between 8 mm and 15 mm diameter. It should be noted that the verification of circuit integrity by testing to BS 8434-2, for instance, involves cable fixings of this order.

There are, however, certain installation areas that are relatively inaccessible, where slightly longer fixing intervals for vertical drops of cable may be viewed as satisfactory after suitable risk assessments have been conducted and considered by both the system designers and installers. One particular situation of this type is the vertical cable drop from a roof or floor connecting to a device installed within a suspended ceiling. The cable industry has carefully considered this situation and has recommended a relaxation whereby vertical drops of cable within concealed ceiling spaces may be installed without fixing to an element of structure, provided that the following important points are observed.

- The maximum vertical cable drop should be 1 m.
- Fixings elsewhere along the cable run should be provided as close as reasonably practicable to the vertical drop to constrain cable movement and minimize cable slack.
- Any loop of spare cable, to accommodate subsequent re-termination at a later date, should be securely fixed. The loop should be securely fastened so as to prevent kinking.
- Careful attention should be given to compliance with the manufacturer's minimum bending recommendations; this applies particularly to cable in a loop, cable entering a device or surface box, or at changes in direction from the last supporting fixing. In general, the size of any loop should not exceed 150 mm diameter, unless the minimum bending radius so necessitates.
- Surplus horizontal cable should be kept to an absolute minimum.
- The general fixing guidelines in BS 7671 should be complied with, unless specific circumstances render them inappropriate.

3.14 Sound pressure levels

Query

BS 5839-1:2002+A2, **16.2.1**, recommends that, for background noise above 60 dBA, the sound level should be 5 dB above that background noise. For an area less than 60 m^2, the sound pressure level need only be 60 dBA, but what alarm sound pressure level would then be recommended if the background noise were between 55 dBA and 60 dBA in these areas?

Answer

Strictly, in the circumstances envisaged, in which, for a small area, a sound pressure level of 60 dBA would be accepted as a minimum, even if the background noise level is between 55 dBA and 60 dBA, compliance with the recommendations of BS 5839-1 would only necessitate a fire alarm sound pressure level of 60 dBA. In practice, in a small area of this nature, the fire alarm signal is still likely to be discernable from background noise, unless the frequency range of the background noise is close to that of the fire alarm signal. In the latter case, because of the masking effect of the background noise, it might be appropriate to increase the minimum sound pressure level of the fire alarm signal to, for example, 5 dB above the ambient noise level, even though this would not, strictly, be necessary for compliance with **16.2.1**.

3.15 Dual redundancy requirement for Category P systems

Query

Does the recommendation for two sounder circuits [BS 5839:2002+A2, **12.2.2**j)] apply for property protection?

Answer

The purpose of the second sounder circuit in a Category M or L system is to ensure that occupants do not re-enter a building after evacuation if fire alarm sounders cease to operate as a result of the effects of fire on a sounder circuit. Since, for Category P systems, BS 5839:2002+A2, **16.2.2**, makes no recommendations for minimum sound pressure level, it would be inappropriate to apply **12.2.2**j) to fire alarm sounder circuits in a Category P system. However, as is commonly the case, if the Category P system is combined with a Category M system (a Category P/M system), then a minimum of two sounder circuits should be provided as recommended in **12.2.2**j).

3.16 Under-pillow alarms

Query

Pillow alarms for people with impaired hearing do not seem to be available with proper monitoring. My understanding is that if the signal plug is inadvertently pulled out of the wall socket or if the cable under the pillow becomes frayed and breaks, a fault ought to be displayed at the fire alarm CIE. In the absence of suitable product from manufacturers, may I use what is available?

Answer

BS 5839:2002+A2, **18.2.1**b), does indeed recommend that circuits serving tactile alarm devices, including pillow alarm devices provided for deaf

or hard of hearing people, be monitored. However, BS 5839-1 is a Code of Practice and variations from its recommendations are possible subject to the agreement of all the interested parties. One basis for a variation might be the difficulty in sourcing equipment that enables full compliance.

3.17 Addressable detector loops serving more than one building: provision of short circuit isolators

Query

BS 5839-1:2002+A2, **12.2.2**, sets limits on the maximum area that may be disabled by a single cable fault, which, in effect, defines locations of short circuit isolators within a building. What is the philosophy behind this limitation?

Furthermore, I can find nothing in BS 5839-1 to advise as to whether, in a single addressable fire alarm system serving several buildings, there is a need for short circuit isolators in a detector loop that serves more than one building, at the boundaries of each building. What is the intent of the standard in such cases?

Answer

When addressable fire alarm systems were first introduced, the Committee welcomed their benefits, while also taking the view that the use of a new technology should not bring about any reduction in reliability or integrity of the system, or any reduction in the availability of the system to operate on demand. Reliability involves, amongst other things, the use of reliable components. Availability is enhanced by circuit monitoring, so that faults are indicated automatically, and can then receive early attention and repair. Integrity involves arrangements whereby, in the event of a fault, the extent to which protection is compromised is minimized.

To ensure that, as far as practicable, the (then) new technology systems did not reduce the level of integrity, a principle was adopted whereby the integrity of the system (e.g. protection disabled by a single cable fault) was just as good as it would have been if a conventional (non-addressable) system had been installed instead of an addressable system.

Applying this to the specific issue of short circuits and limitation of their effects, the Committee noted firstly that in the event of a single short circuit anywhere on manual call point/detector wiring of a conventional fire alarm system, the worst case scenario is that protection would be disabled throughout a single detection zone of the system. Accordingly, the principle was adopted that if an addressable system were used, the protection disabled should be no greater.

However, it was considered that short circuit isolators need not necessarily be provided at every zone boundary. For example, this would have resulted in a situation whereby a designer who treated an open plan warehouse of 2 000 m^2 as a single detection zone (as permitted by the standard) would need to provide no short circuit isolators within the warehouse, while another designer who, to provide better indication of the location of a fire, subdivided the warehouse into four detection zones, each of 500 m^2, would need to include three short circuit isolators. The Committee considered it would be inequitable to impose this penalty on the second designer

simply for providing, in effect, a higher standard than the minimum necessary for compliance with BS 5839-1.

This rationale led to the recommendation within BS 5839-1 that in the event of a single cable fault, the area throughout which detectors are disabled should not exceed 2000 m^2 or (with certain exceptions) one single floor of the building, as these are the maximum areas permitted for a detection zone.

The reason the scenario described in the second part of the question is not considered in BS 5839-1 is that, with the exception of Clause **24** (networked systems), the standard is written around a single fire alarm system in a single building. Even in the case of Clause **24**, there is an implied assumption that each individual building in a networked system serving several buildings would have its own sub-panel on the network.

Notwithstanding this, the Committee acknowledges that the situation described in the question might occur (e.g. in the case of a cluster of small buildings, each with only a few manual call points and/or detectors, such that a single detector loop would be used for all the devices within the buildings).

If the principles described here are applied to the question of a group of buildings on a single site (e.g. an industrial site occupied by a single company), often each building would have its own fire alarm system. Thus, a fault on the fire alarm system wiring in any building would have no effect whatsoever on the protection in other buildings.

However, as envisaged in the question, a cluster of buildings might be protected by a single fire alarm system. In this case, unless the buildings were each very small, custom and practice would be such that each building would constitute a separate detection zone on a conventional fire alarm system. In the event of a cable fault, on the wiring of a detection zone, only the protection in that building would be disabled. In this case, if the buildings were protected by a single loop of an addressable system, with each building separately zoned, it would be logical to fit short circuit isolators at the boundaries of each building.

However, in practice, it might be reasonable for a small cluster of very small buildings on the site to be treated as a single zone (e.g. a number of small huts and plant areas, each with only one or two manual call points). In the case of a conventional system, there would be a cost penalty in providing more than one circuit and, hence, more than one detection zone. In this case, the Committee considers that, in an addressable system, there would be no need for short circuit isolators between buildings, regardless of the number of detection zones that the designer chooses to create (e.g. the designer may choose to allocate a single detection zone to each building, simply because there are available zones and to do so brings no cost penalty).

Accordingly, a reasonable approach would be to consider whether, in the case of a conventional (non-addressable) system, the buildings could reasonably constitute a single detection zone. If so, it would, arguably, be unreasonable to require any short circuit isolators between buildings. If more than one zone would have been provided in a conventional system, short circuit isolators should be provided at the boundaries of the detection zones into which a conventional system would be subdivided.

It should be noted that if no manual call points, detectors or sounders were connected to the loop other than in one single building (i.e. the

loop served only one building, but was routed to/from the CIE via other buildings), it can reasonably be argued that no short circuit isolators would be necessary between buildings, as this situation is no different from that commonly found on an industrial site, in which detection zone wiring for one building is routed from the CIE through other buildings. Equally, short circuit isolators could be used to enhance the integrity beyond the minimum necessary to satisfy the principles of BS 5839-1.

The Committee also noted that, in practice, the use of short circuit isolators between buildings has much less bearing on the safety of occupants from fire than in the case of short circuit isolators within any building. It is very unlikely that, following a fire or fault that damages cable in one building within a cluster of buildings, there will be a fire in a second building within the cluster before the cable fault is rectified.

However, if a fire in one building disabled the fire detection and fire alarm system in a second building, it might be necessary to evacuate the second building as occupation of that building without a working fire alarm system might contravene fire safety legislation; this could then cause interruption to business that could have been avoided by use of short circuit isolators.

3.18 Termination of critical signal path cables conforming to BS 7629-1 (sometimes, colloquially, described as "soft skin cables")

Query

Do fire cables conforming to BS 7629-1 have to be terminated into fire alarm initiation points (manual call points, automatic fire detection devices, etc.) and fire alarm devices (sounders, etc.) using compression glands?

Answer

BS 5839-1:2002+A2, **37.2**, states that the fire alarm system should conform to the requirements of BS 7671.

BS 7671:2008, **522.8.5**, states, "Every cable or conductor shall be supported in such a way that it is not exposed to undue mechanical strain and so that there is no appreciable mechanical strain on the terminations of the conductors, account being taken of mechanical strain imposed by the supported weight of the cable or conductor itself."

There are several scenarios that require consideration.

a) Cables in ceiling/floor voids terminating into devices (e.g. smoke detectors on the room side of a ceiling tile). In this scenario, cables should be terminated into the device by the use of suitable conduit boxes and compression glands. If the cables are not terminated in this way, cables and terminations could be placed under undue mechanical strain by interference from people working in the void and moving the cables either deliberately or inadvertently. Additionally, in a fire situation, the surface to which the detector is attached might collapse due to fire damage, again causing undue mechanical strain on the cables and terminations, which could in turn adversely affect the operation of the fire detection and alarm system.

b) Cables running vertically to a manual call point. In this case, it might be possible to exclude the compression gland if the back box for the manual call point is either too shallow to enable the use of a compression gland in a flush installation or protective mini trunking is used in a surface installation.

Glands also serve the purpose of excluding dust, water, insects or any other item or species. Manufacturers of fire resisting cables recommend the use of compression glands to terminate cables and therefore cable installers should check with the relevant manufacturers as to the effect upon the fire performance of cables when terminated without compression glands.

3.19 Cable protection in partitions

Query

What level of protection do cables need when installed within wall partitioning too narrow to allow for trunking or installed less than 50 mm from the surface?

Answer

Any part of a fire detection or fire alarm system in accordance with BS 5839-1 that is not with either SELV or PELV should fully meet the requirements of BS 7671:2008, including **522.6.6**, **522.6.7** and **522.6.8**. Furthermore, BS 7671:2008, Chapter **11** and Chapter **56**, refer to BS 5839-1 as supplementing its requirements. BS 5839-1 in various clauses refers to BS 7671. BS 5839-1:2002+A2, **29.1**, notes that the recommendations of BS 7671 regarding safety and earthing are applicable, and also notes that the fire alarm is a special installation operating largely at extra low voltage (ELV).

BS 5839-1:2002+A2, **26.1**, includes a reference for the need of low voltage (LV) circuits to conform to the requirements of BS 7671:2008, **522.6.6**, **522.6.7** and **522.6.8**, which relate to mechanical impact protection of LV cable and list various options, including appropriate selection of cables and suitable cable management systems. BS 7671 further requires that the cable is mechanically protected and is electrically protected by the use of a residual current device (RCD).

BS 5839-1:2002+A2, **37.2**a), states that the entire system should conform to the requirements of BS 7671, but where any such conflict is considered to exist between the two standards, the recommendations of this standard should take precedence (i.e. BS 5839-1).

It has always been the case that any part of a fire detection or fire alarm system in accordance with BS 5839-1 that is supplied with a special type of LV circuit that is either safety extra low voltage (SELV) or protective extra low voltage (PELV) that fully conforms to the requirements of BS 7671:2008, **414**, is considered to give protection against electric shock in accordance with BS 7671:2008, Chapter **41**, and takes precedence over other requirements of BS 7671.

3.20 Category L2 automatic fire detection and alarm systems in hotels

Query

The current guidance in BS 5839-1 in respect of the provision of a Category L2 fire detection and alarm system in hotels can be met by

installing heat detectors in hotel bedrooms which have doors opening on to the escape route, plus having smoke detectors in the escape route (e.g. in the corridors). In view of the Regulatory Reform (Fire Safety) Order 2005 [2] (and equivalent legislation in Scotland [3] and Northern Ireland [4]), which requires that all relevant persons are adequately protected, does the current guidance need to be reviewed so as to recommend that smoke detectors are required in hotel bedrooms?

Answer

Using smoke detectors, which are effectively small particle detectors, in hotel bedrooms is likely to give an increase in false alarms. The false alarms could be caused by, for example, steam from bathrooms and kettles within hotel bedrooms, aerosol sprays, smoke from cigarettes, plus other items guests might use. An increase in false alarms could lead to mistrust in the fire alarm system, which could result in delays in responding to a genuine alarm and hence a lower standard of fire safety.

The use of heat detectors in hotel bedrooms could provide some protection for occupants of the room of fire origin. They provide a warning to occupants of the hotel well before any part of the means of escape is compromised by a fire originating in a bedroom.

Fire statistics show that the probability of a fire starting in a hotel bedroom is very low (around one bedroom fire per million guest-nights per annum). There is virtually negligible experience of deaths in the bedroom of fire origin, regardless of the type of detector installed in the bedroom.

The BSI committee responsible for BS 5839-1 has not received any evidence that the current recommendations given in the standard, in respect of hotels, need to be changed. The position of BS 5839-1 in this respect has been recognized as a case-specific example in a Determination by the relevant Government department in England and Wales on the use of heat detectors in the bedrooms of one particular hotel. This case-specific Determination ("Determination in respect of the fire safety adequacy of fire detection in a hotel, reference 004/006/003") can be found at www.communities.gov.uk [5].

It is normal to fit a Category L2 system in most hotels. However, the decision as to which category of system to install will, of course, depend on the fire risk assessment.

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For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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1) Now withdrawn. Referred to in Foreword only.

2) Referred to in Foreword only.

3) Available from www.cfoa.org.uk.

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