Welcome to the FIA CPD seminar on the changes to BS 5839-1:2017

Presented by
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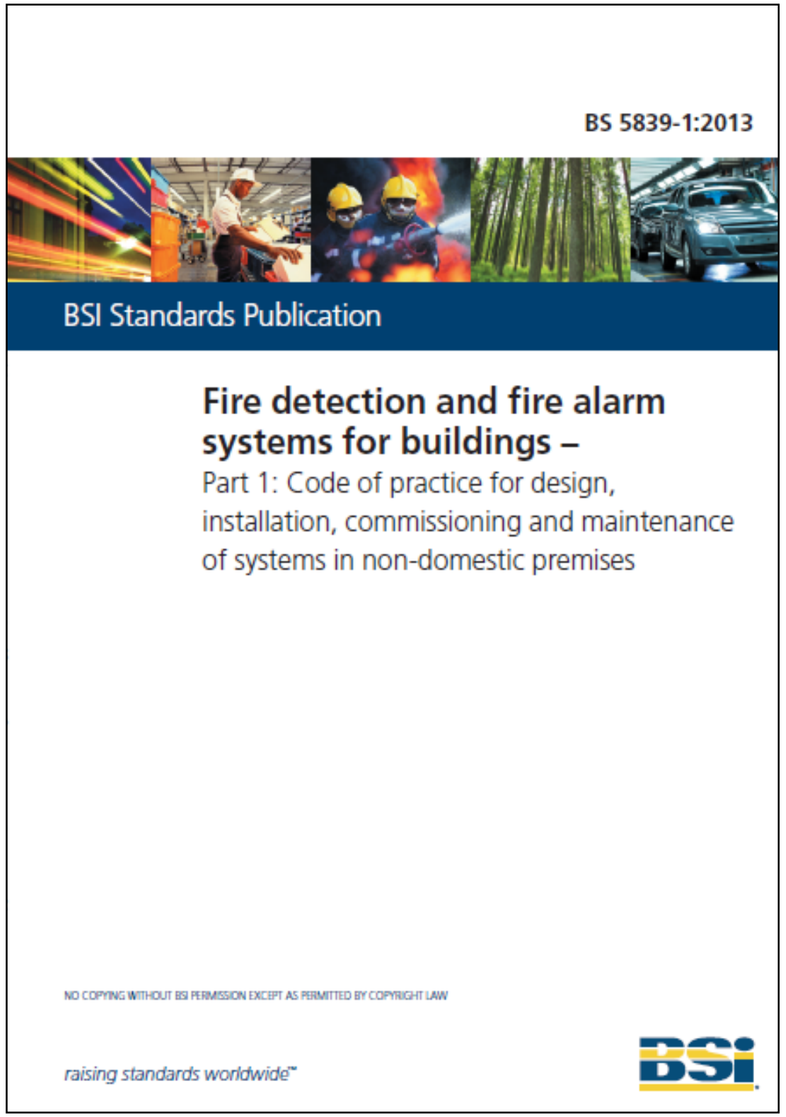
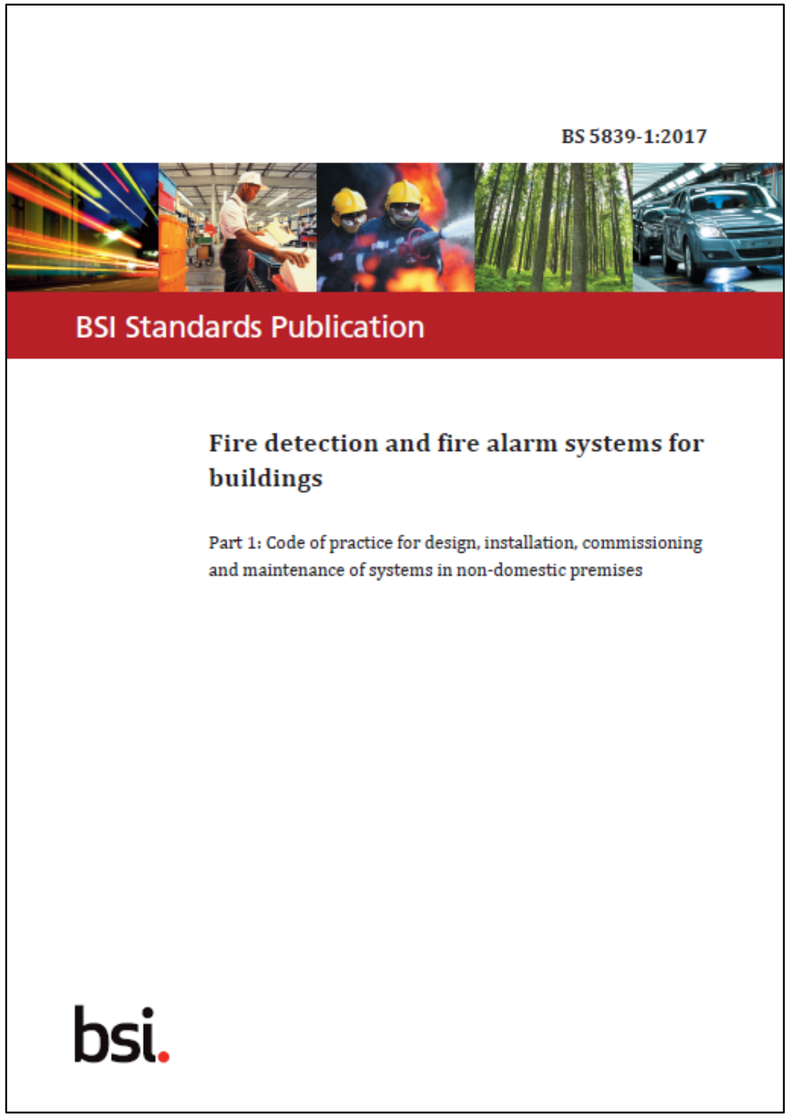
Published

Fire Industry Association





BS 5839 Part 1 History

Fire Industry Association

Clause 2 Normative references

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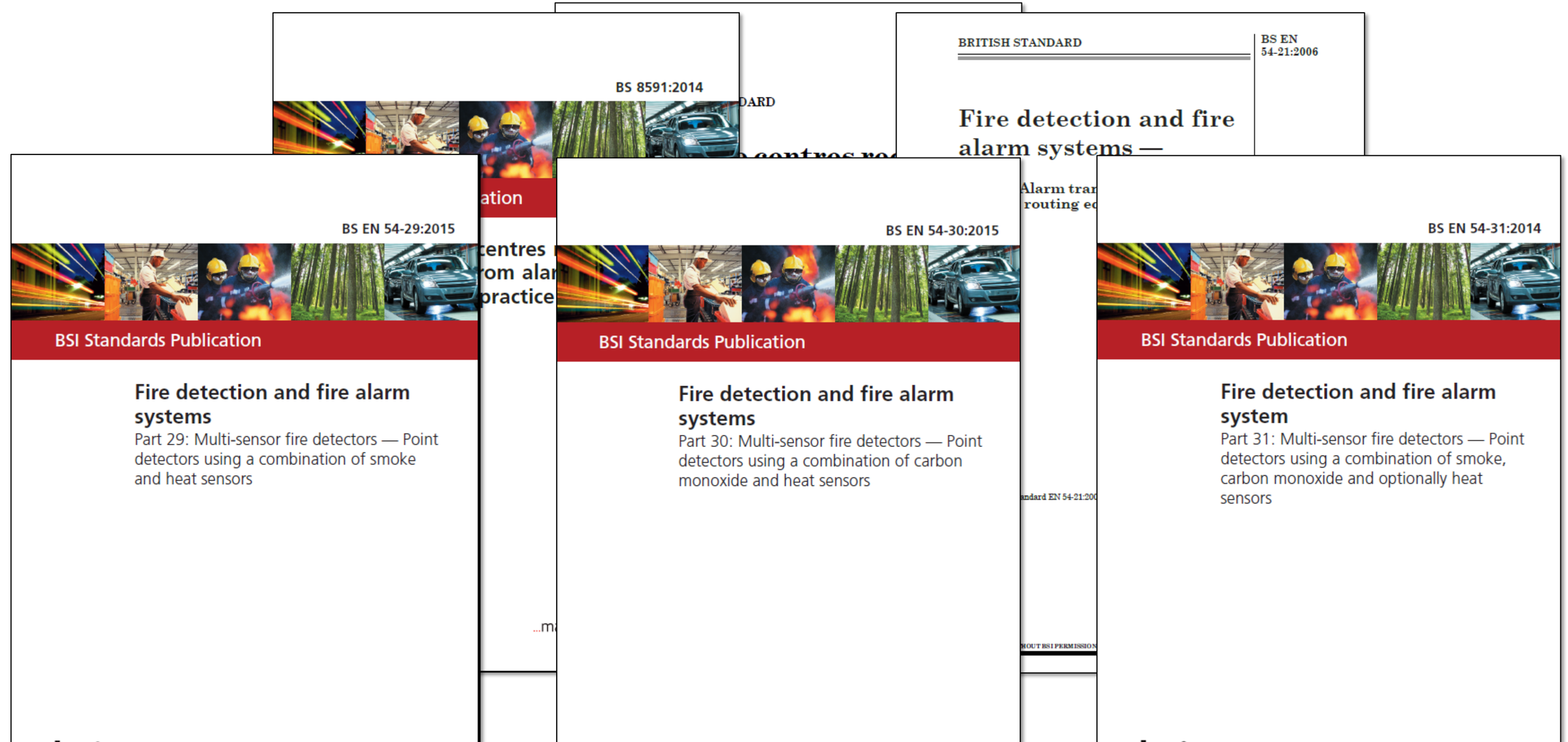


Clause 3 Definitions

- 3.14 Critical signal path

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 and (where provided) transmission equipment within the premises for routing of signals to an ARC

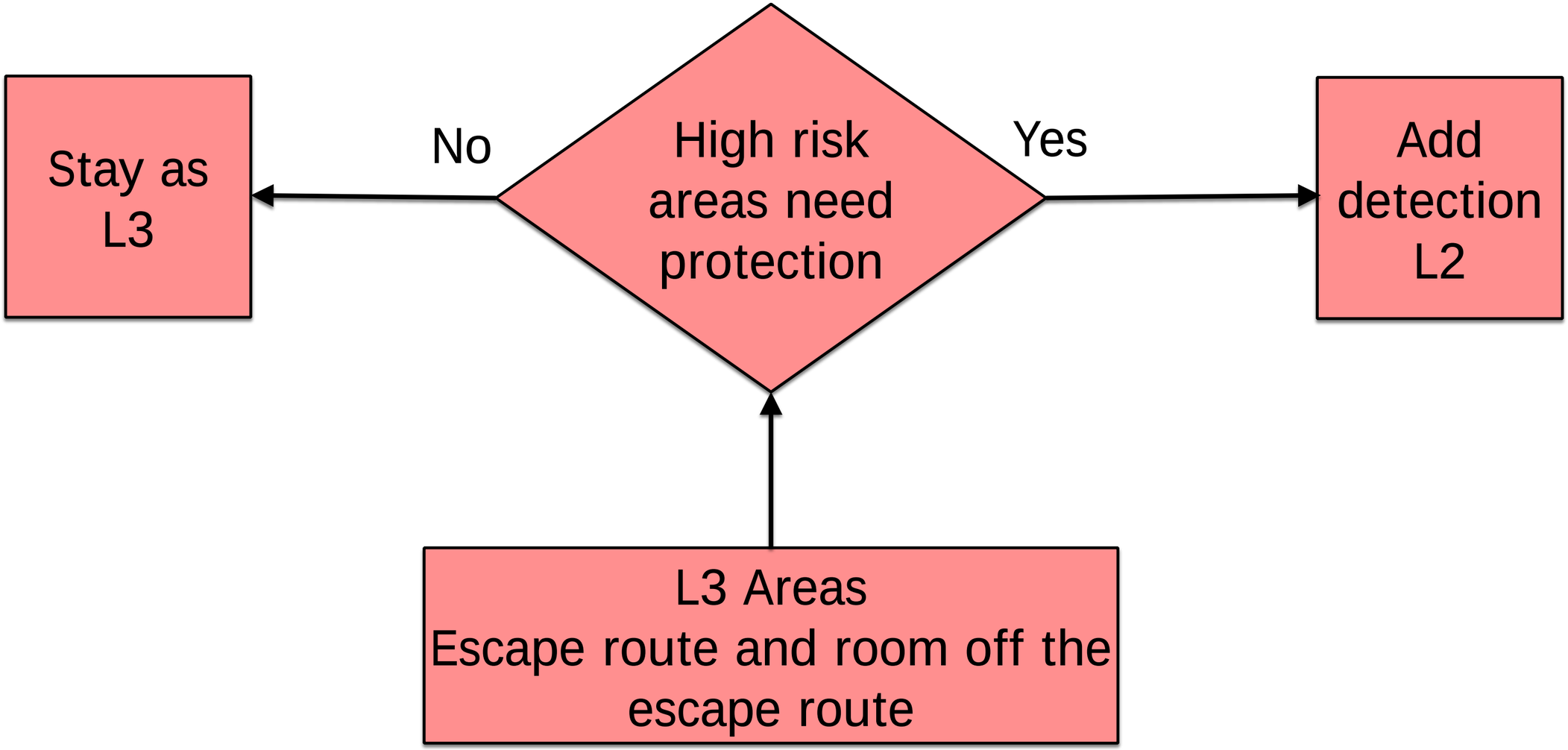
- 3.62 Unwanted fire alarm signal (UFAS)

false alarm from an automatic fire detection and fire alarm system that has been passed on to the fire and rescue service

Multi-sensors in escape routes

- Multi-sensors that have fire sensitivity of BS EN 54-7 are now acknowledged as suitable for fire escape routes
- Configuration must include smoke detector mode

L3 And L2 Relationship



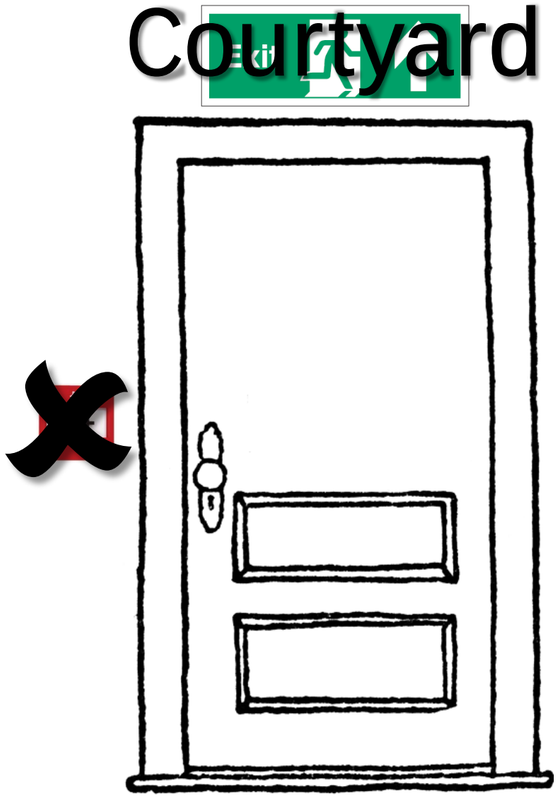
The use of Manual Call Point covers

20.2 b) All MCPs should be fitted with a protective cover, which is moved to gain access to the frangible element

Manual call points

Expanded Clause 20.1 To emphasize “place of ultimate safety”

MCPs should be located on escape routes and, in particular, at all storey exits and all exits to open air that lead to an ultimate place of safety (whether or not the exits are specifically designated as fire exits).



Manual call points

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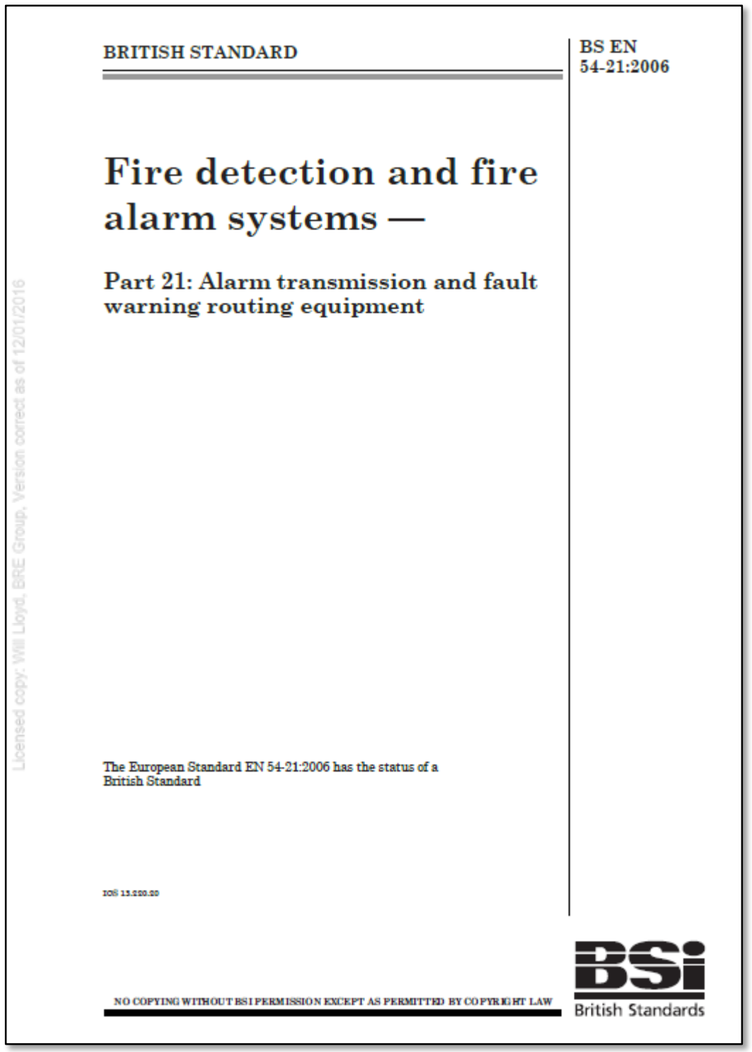
Some openings in the building envelope (such as a roller shutter door) are not normally considered as a pedestrian exit, but in an emergency are likely to be used as such.

Communication with the fire and rescue service



BRITISH STANDARD

BS EN 54-21:2006

Fire detection and fire alarm systems —

Part 21: Alarm transmission and fault warning routing equipment

The European Standard EN 54-21:2006 has the status of a British Standard

ICS 13.220.20

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BSi British Standards

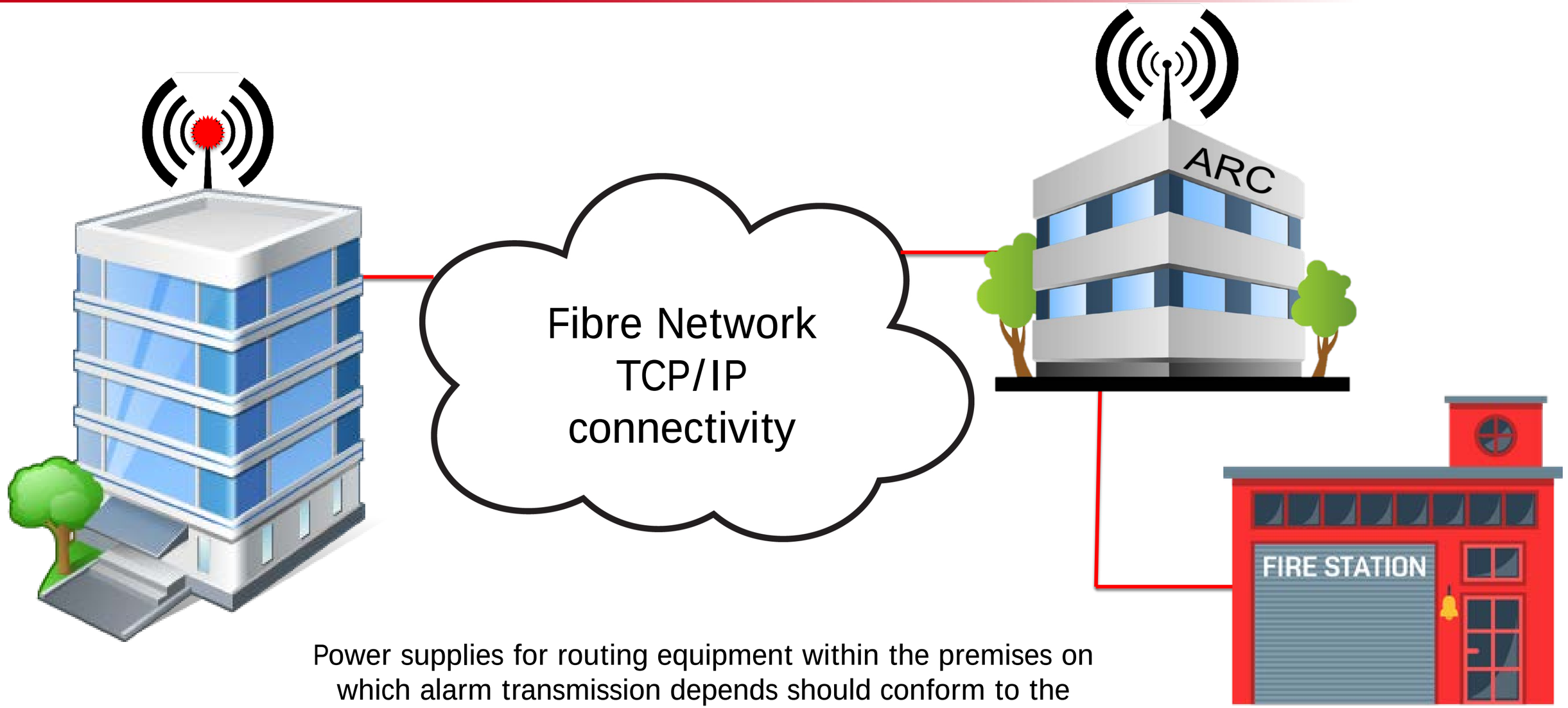
11.2 u)
Alarm transmission and fault warning routing equipment should conform to the product requirements (but not the installation requirements) specified in BS EN 54-21.

Communication with the fire and rescue service

15.2 n)
Where fire alarm signals are routed via the routing equipment of an intruder alarm system, the standby power supplies for the routing equipment should conform to the recommendations in **25.4**.

i.e. 24hr standby capacity

Communication with the fire and rescue service



Power supplies for routing equipment within the premises on which alarm transmission depends should conform to the recommendations of **25.4**e). i.e. 24hr standby capacity

Communication with the fire and rescue service

15.2 New Sub-clause added

o) If it is intended for the CIE to signal a fault from the fire alarm system to an ARC, the CIE should have a suitably monitored means of interfacing with the relevant fault routing equipment.

NOTE 9 Monitoring may be performed by the fault routing equipment. For example, the connection between the CIE and the fault routing equipment may comprise a cable from an input in the fault routing equipment to the common fault relay in the CIE, such that an open circuit fault in the cable results in transmission of a fault signal to the ARC

Communication with the fire and rescue service

15.2 New Sub-clause added

p) Faults in either the alarm transmission equipment or in the alarm transmission path should be displayed at the CIE.

NOTE 11 It is recognized that temporary loss of service in the alarm transmission path or service provision might occur. The risk associated with loss of communications can be mitigated by use of a dual path alarm transmission system where primary and secondary signal paths are provided. For dual path alarm transmission systems, loss of both signal paths is indicated as a fault at the CIE. However, it is not necessary to indicate loss of a single transmission path at the CIE.

Communication with the fire and rescue service

15.2 New Sub-clause added

q) Where the alarm transmission path relies upon a physical TCP/IP or similar data connection, the following recommendations apply.
1) Final connections to the alarm routing equipment should be secured against unauthorized disconnection.
2) Power supplies for routing equipment within the premises on which alarm transmission depends should conform to the recommendations of 25.4e).

NOTE 12 Where there is a dual path alarm transmission system, the recommendations contained in 15.2q)2) need only be applied to one of the transmission systems.

Communication with the fire and rescue service

15.2 New Sub-clause added
q) Cont.
3) The physical data network cable used for alarm transmission within the building should be differentiated from other services by colour.

NOTE 13 Where the network cable cannot conform to the recommendations of 15.2q)3), or where local data network reliability is a concern, a dual path alarm transmission system would be beneficial.

Communication with the fire and rescue service

Amendment to Sub-clause 15.1
Alarm transmission systems that incorporate reporting of an alarm transmission path (ATP) failure are preferred.
The reporting time period varies with the ATS category selected (32 days to 90 seconds). BS EN 50136-1 shows these performance criteria together with alarm transmission times and the ATS and ATP availability in any 7-day period.

PD 6669 gives guidance that is additional to BS EN 50136-1, with particular reference to dual path alarm transmission systems.

Communication with the fire and rescue service

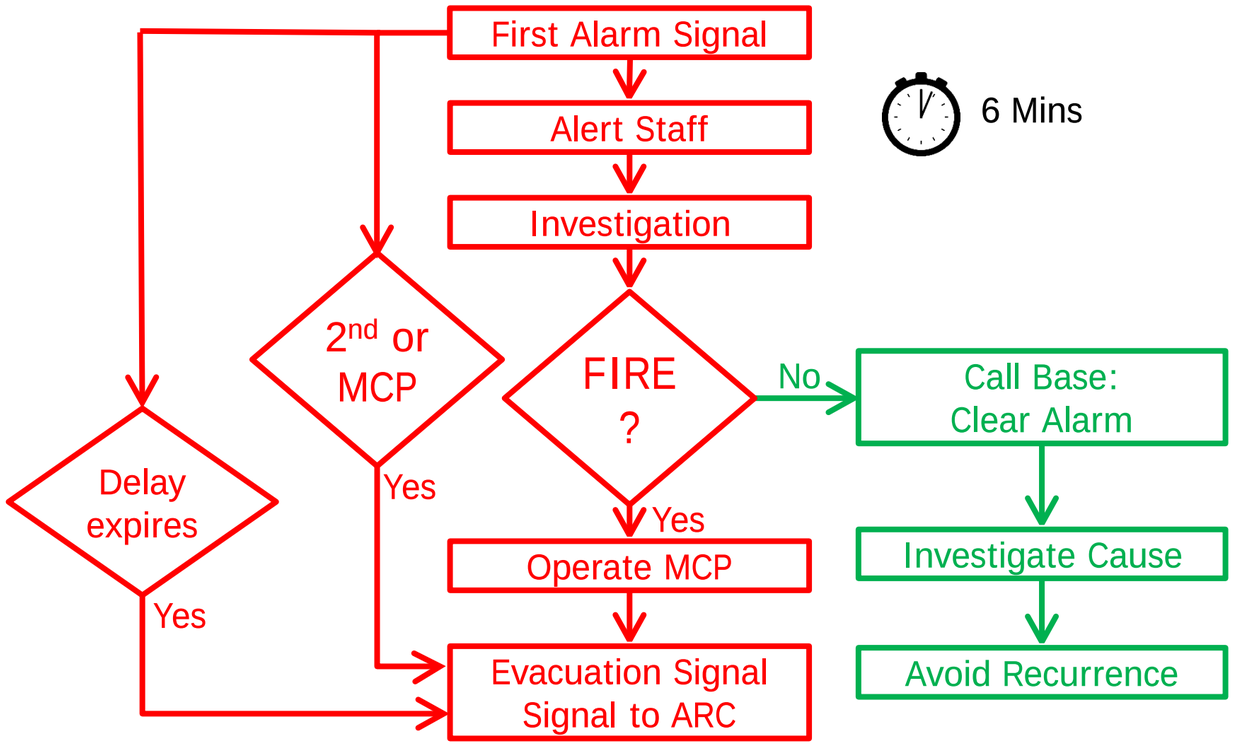
Fire Industry Association

	SP1	SP2	SP3	SP3+	SP4	SP5	SP6	DP1	DP2	DP2+	DP3	DP4
Primary ATP reporting time	32 days	25 h	30 m	10 m	3 m	90 s	20 s	25 h	30 m	10 m	3 m	90 s
Alternative ATP Maximum period when primary operational	Op	Op	Op	Op	Op	Op	Op	0 h	25 h	25 h	25 h	5 h
Alternative ATP maximum period when primary failed	Op	Op	Op	Op	Op	Op	Op	25 h	30 m	10 m	3 m	90 s
Catastrophic failure	32 days	25 h	30 m	10 m	3 m	90 s	20 s	25 h	31 m	11 m	4 m	3 m
ATS reporting timea)	32 days	25 h	30 m	10 m	3 m	90 s	20 s	50 h	60 m	20 m	6 m	3 m

a) Where an ATS includes more than two ATPs, the ATS reporting time should meet the requirements of this table.

NOTE Op = Optional.

Staff Alarms



Amendment to 19.2.2 c) Recommendations applicable to staff alarms

c) Staff alarms should normally be generated only in response to signals from automatic fire detectors, but not in response to signals from manual call points, heat detectors or sprinkler systems. However, in premises, other than residential care homes, that generate a high number of unwanted fire alarm signals, automatic transmission of a signal to an ARC might be delayed pending investigation of alarm signals from these devices. Any proposal to use a staff alarm as the initial response to a signal from a manual call point should be subject to special consideration.

Video fire detectors

- A form of video analytics in which video cameras monitor the protected space.
- Video fire detectors rely on appropriate and continuous illumination of the field of view. Such lighting can be normal lighting, specially installed infrared light sources, or a combination of the two.
- Video fire detectors can also be used as a means of verifying a fire
- Where they are the sole means of detection, they need to be designed, and their suitability and performance verified, by a qualified specialist.

Types of fire detectors and their selection

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Additional text to 21.1.8 Choice of detection principle
Single-sensor fire detectors are suitable in most instances. However, certain multi-sensor fire detectors can provide, depending on the detection algorithm used, some or all of the following advantages in certain applications:

- when the expected fire is of a specific type;
- when the expected fire does not produce smoke particles;
- when there is a specific threat from a certain type of unwanted alarm (see Clause **35);**
- when the risk varies at different times of day; or
- when it is deemed advantageous to standardize on one type of detector for all areas of the building.

Some multi-sensor detectors can be configured into an operating mode for which they have not been certificated or do not conform to standards.
Any variation in configuration from that first designed can be recorded as explained in Annex E..

Spacing and siting of automatic fire detectors

Fire Industry Association

Additional text to sub-clause 22.1

For remotely situated or hard-to-access detection equipment, consideration needs to be given to the feasibility of testing and maintenance at the design stage.

Spacing and siting of automatic fire detectors

Fire Industry Association

Amended text to sub-clause 22.2 b) and c)

b) In stairways, fire detectors should be sited at the top of the stairway and on each main landing.
c) Other than in Category L4, L5 and P2 systems, if any flue like structure, shaft for a lift, escalator or hoist, or any enclosed chute, penetrates one or more ceilings, a fire detector should be sited at the top of the shaft or enclosure and, on each level in the accommodation area, within approximately 1.5 m of the penetration.

Spacing and siting of automatic fire detectors

Fire Industry Association

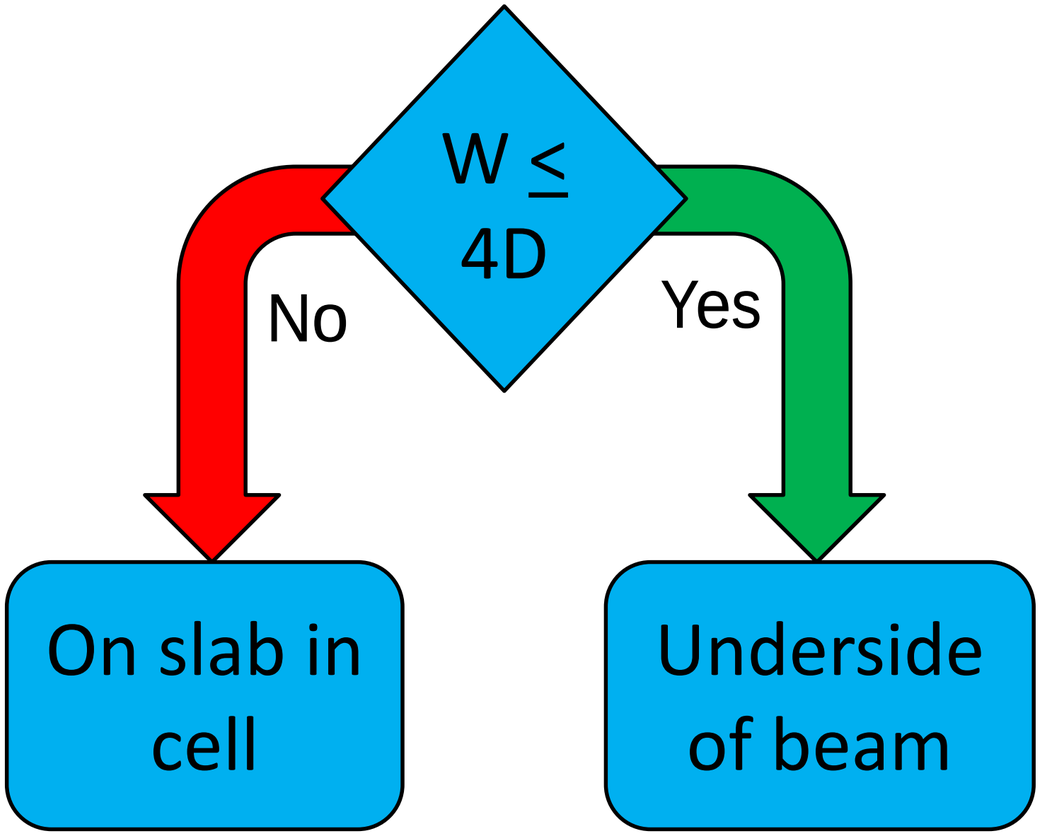
Sub-clause 22.3 Recommendations for siting of heat, smoke and multi-sensor detectors
Sub clause a) New Note

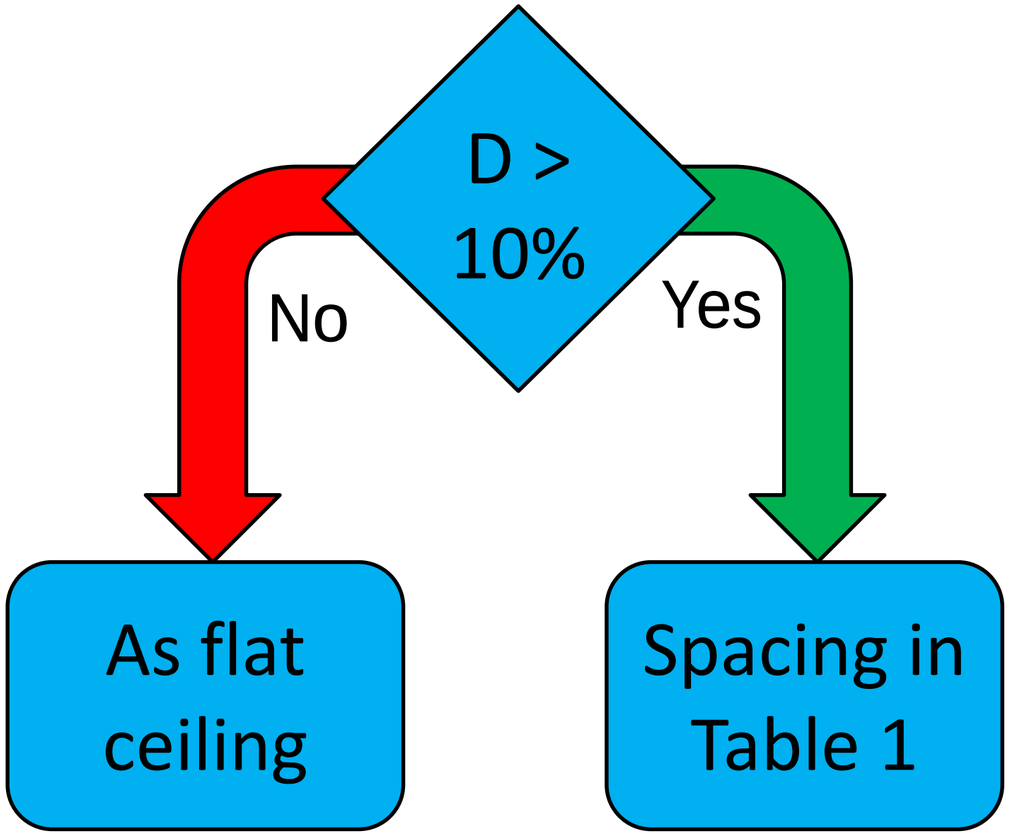
NOTE 2 *Where it is the design intention regularly to disable sensors in a multi-sensor fire detection system, such that the sensors rely solely or substantially on a heat detector, the location of sensors is governed by* ***22.3a)2).***

Detector spacing & siting on honeycomb ceilings

W = Width of cell

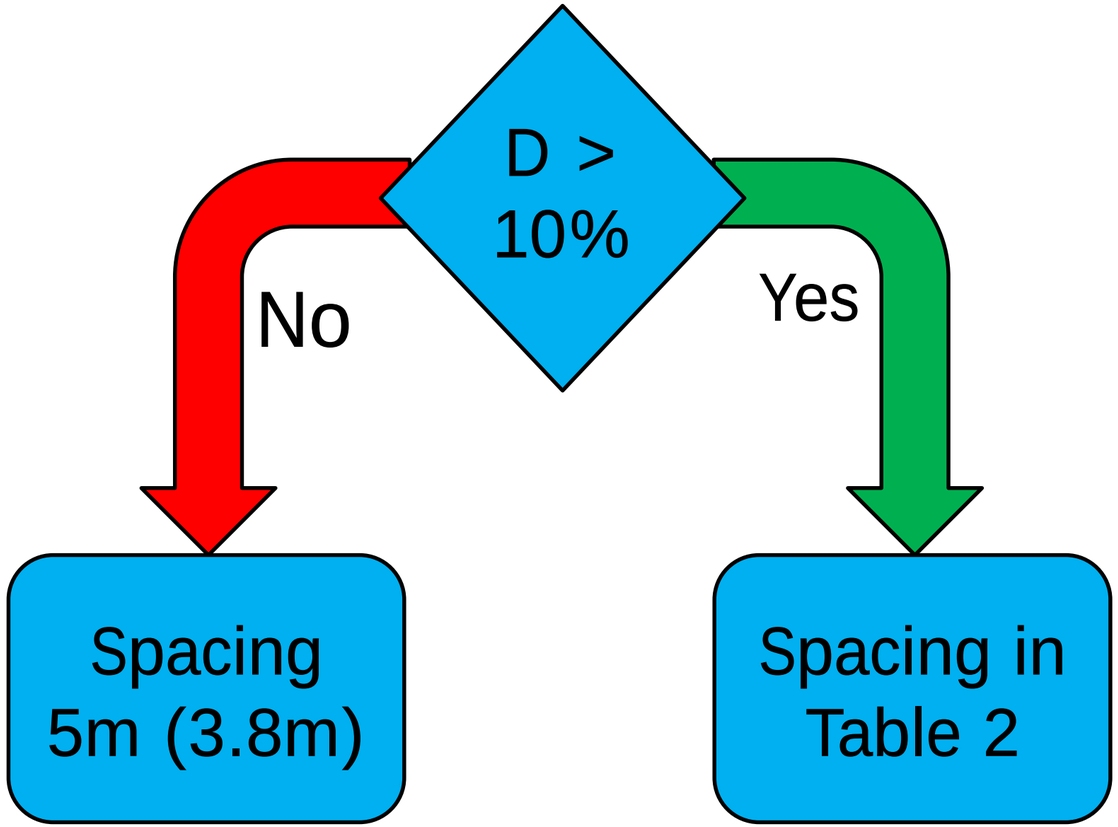
D = Beam depth relative to room height





Detector spacing & siting on ceiling with beams

D = Beam depth relative to room height



Siting of optical beam smoke detectors

Fire Industry Association

Sub-clause 22.5 Recommendations for siting of optical beam smoke detectors

- Reworded 22.5 a) – but fundamentally no change to the 15m spacing recommended
- Additional text and notes added to 22.5 d)

  relates to four instances where beams may be installed >600mm from the ceiling...

  The first two relate to supplementary detection

  1. When the beams form a low layer of detection intended to detect a rising plume
  2. When the beams are angled through the space to detect a stratified smoke layer

  The others relate to practical limitations preventing installation within 600mm of the ceiling

  3. When the beam is close to an apex
  4. When the beam is under a cluttered ceiling and compensatory measures are included

Siting of optical beam smoke detectors

Fire Industry Association

Sub-clause 22.5 d)

Optical beam smoke detectors may be installed at a distance of more than 600 mm below ceiling level (or 600 mm below the apex of a pitched roof) in the following circumstances.

1)
When the optical beam detectors are intended to provide supplementary detection of a rising smoke plume within a high space (e.g. an atrium).
In such cases, the width of the area protected on each side of an optical beam should be regarded as 12.5% of the height of the beam above the highest likely seat of fire.

NOTE 1 *Where there is no discernible fire load above such a layer of detectors it may be justifiable to forego the provision of detection at or near the ceiling.*

Siting of optical beam smoke detectors

Fire Industry Association

Sub-clause 22.5 d)

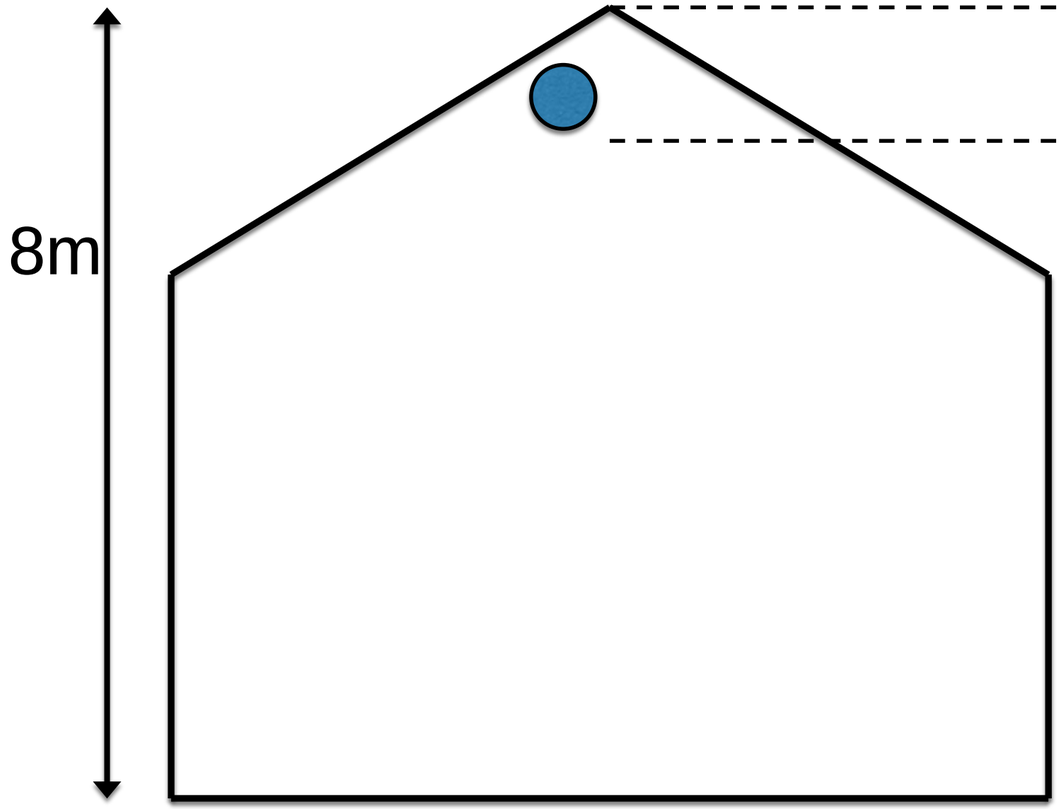
....

2)
When the optical beam detectors are installed at an angle from the horizontal, pointing down from the ceiling, in order to provide supplementary detection of smoke stratifying and failing to reach the ceiling

NOTE 2 The spacing recommendations for angled optical beam detectors within the 3 dimensional space below a ceiling is beyond the scope of this code of practice. However, while it is possible that single angled optical beam detector will eventually detect a spreading layer of stratified smoke the installation of more beams, strategically positioned through the 3 dimensional space will provide a substantially better chance of detecting stratifying smoke and reduce detection times. In the most general terms, for every one optical beam detector at the ceiling a further two or three detectors angled through the space might be appropriate.

(There is further FIA sponsored research published on this subject: See AUBE 2017 session 19)

Siting of optical beam smoke detectors



3)
When the optical beam is positioned close to the apex of a pitched roof and the physical features in the roof space prevent it being installed in accordance with 22.3d).
In such cases the vertical distance of the optical beam from the apex should be minimized (within the practical restraint of the building) and should not exceed the lesser of H/10 (where H is the height of the apex above the floor) and 2.5 m.

Siting of optical beam smoke detectors

4)
Where the physical features in the roof space prevent the optical beam detector being installed within 600 mm of a horizontal ceiling (in accordance with 22.3e).

In such cases the distance from the ceiling should be minimized and should not exceed the lesser of H/10 (where H is the height of the ceiling above the floor) and 2.5 m.

Moreover, the ppotential negative effects should be compensated by one of the following means:

- Reducing the maximum horizontal spacing as given in 22.5a);
- Use an optical beam detector with enhanced sensitivity compared to the minimum required by BS EN 54-12 (e.g. alarm at 35% attenuation or less); or
- Introduce (or consider any existing) restrictions to flow of smoke across (and potentially along) the ceiling which can restrict the spread of smoke and increase the depth of the smoke layer. Containing the spread of smoke in both directions is preferable.

The degree of the compensation measures should be sufficiently conservative to compensate for the excessive distance from ceiling and in case of doubt a smoke test should be performed.

Ceiling Height Limits

Detection at the top of a lift shaft or flue-like structure –
Recommendations for limits of ceiling height in 22.9 and Table 3 do not apply

If using ASD for flue-like structures The recommendations in Table 3 for the Class and minimum number of ASD sampling holes may be adapted for vertical or flue-like structures. For example, the detection provided by 15 Class C sample points on a ceiling covering just 200 m² can be achieved using fewer sample points at a higher sensitivity, e.g. just 3 sample points which are 5 times more sensitive than the Class C.

Power supplies

Sub-clause 25.2 Recommendations for mains power supplies

c) To facilitate local isolation during maintenance, suitable means should be provided for local isolation of the low voltage supply circuit that serves the power supply and control equipment [see 29.2e)].

29.2 e)

It should be possible to lock the facilities in both the normal and isolate positions to prevent unauthorized use

NOTE 2 Safe isolation is required under the terms of the Electricity at Work Regulations 1989. The previous version of this standard recommended double pole isolation. This is no longer specifically recommended as, under the Electricity at Work Regulations 1989, safe isolation requires verification that isolation has been successful (see Clause 45).

Cables, wiring and other interconnections

The recommendations for cables, wiring and other interconnections have been updated to reflect the currently available standards:

- BS EN 60702-1,
- BS EN 60702-2,
- BS 7629-1
- BS 7846.

In addition, the duration of survival of cables has been referred to the tests in BS EN 50200 and BS 8434-2.

Electrical earthing

Fire alarm power supplies need to conform to BS EN 54-4.

If terminals for extra low voltage (ELV) circuits can be exposed, when for example a detector is removed from its base, the fire alarm power supply needs to meet the requirements of a separated extra low voltage (SELV) installation.

Where the fire alarm is interfaced to ELV equipment that might not be intended for use with removable components, such as fire detectors, the ELV equipment ought to be treated as if it was LV, so as to maintain electrical safety.

Electrical earthing

Sub-clause 29.2 remains the same apart from below;

d) For ELV circuits with removable components (e.g. detectors or parts of detectors) that expose to touch conductive circuit parts at ELV potential, the following applies.

1) All relevant power supplies for the fire detection and fire alarm system should conform to BS EN 54-4.

2) In dry conditions, fire detectors do not have to be locked into their bases.

3) In areas where conditions are wet, the arrangement should be one or more of the following:

i) circuit voltages are less than 15 V ripple free d.c. or 6 V a.c. rms;

ii) a tool or special technique is necessary to remove parts exposing ELV parts; or

iii) the parts are positioned out of reach of persons other than authorized maintenance personnel.

Limitation of false alarms and unwanted fire alarm signals

Fire Industry Association

Reference to false alarms has been expanded to include the term “unwanted fire alarm signals

Manual call points should not be sited where they are likely to be exposed to accidental damage (e.g. by normal operations in the building, trolleys or forklift trucks).

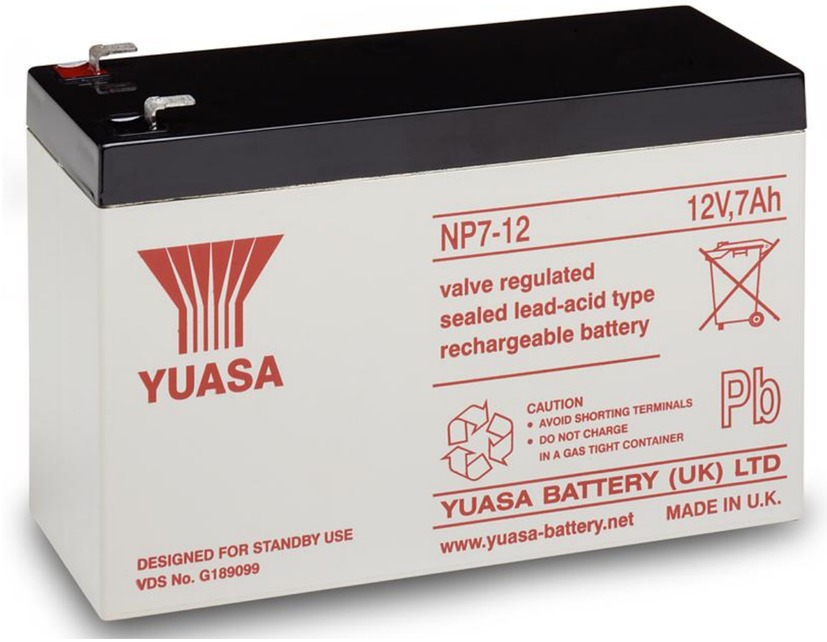
Where compliance with 20.2 makes such siting essential, suitable guards should be provided to prevent impact on the manual call points.

Examples include manual call points located adjacent to fire exits from sports halls and gymnasia in which ball sports are played. Protective covers may be provided for this purpose.

Inspection and servicing

Clause 45.3 Recommendations for periodic inspection and test of the system;

d) The battery voltage should be measured with the mains on to check the steady state charge voltage and check it is within the manufacturer's recommendations before any other tests that might discharge the battery and with no load on the power supply other than the quiescent or standing load.



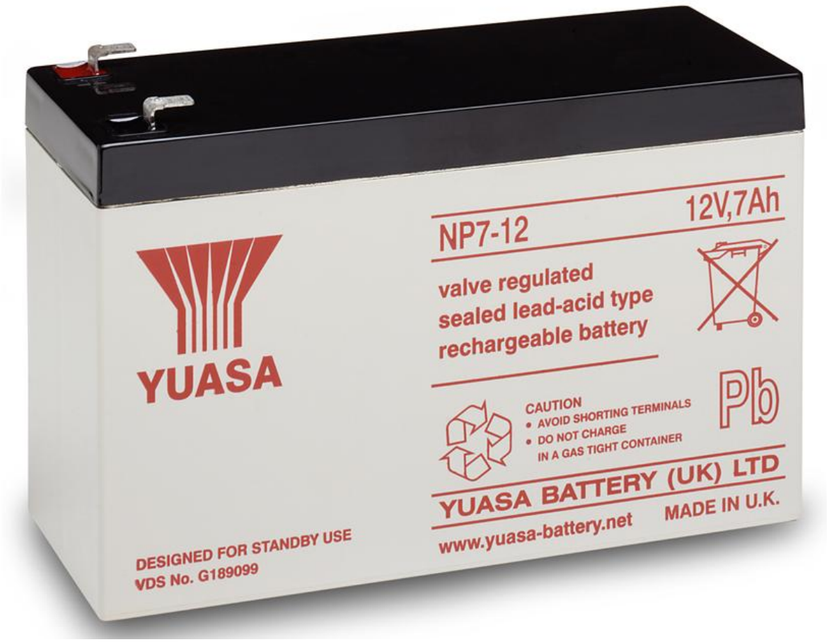
Inspection and servicing

Clause 45.3 Recommendations for periodic inspection and test of the system;

e) The standby battery should be disconnected, the alarms activated and the power supply output voltage checked that it is close to the nominal voltage.

NOTE 1 If applying the full alarm load is not practicable, then the full load may be simulated.

NOTE 2 It would be reasonable to expect the power supply voltage to achieve at least 95% of nominal voltage.

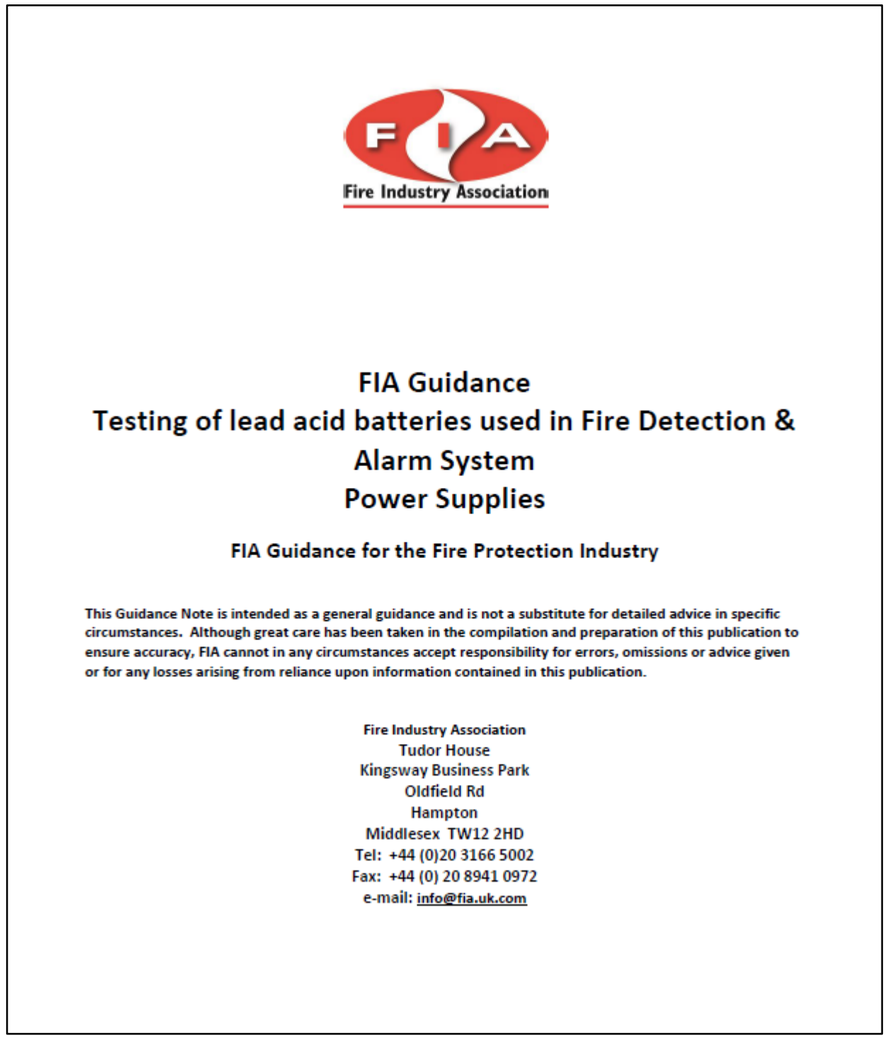


Inspection and servicing

Clause 45.4 Recommendations for inspection and test of the system over a 12 month period Cont.

p) The standby power supply capacity should be checked to establish it remains suitable for continued service.

NOTE 11 Further guidance on testing of the batteries is given in FIA Guidance: Testing of lead acid batteries used in Fire Detection & Alarm System Power Supplies



FIA Guidance
Testing of lead acid batteries used in Fire Detection & Alarm System
Power Supplies

FIA Guidance for the Fire Protection Industry

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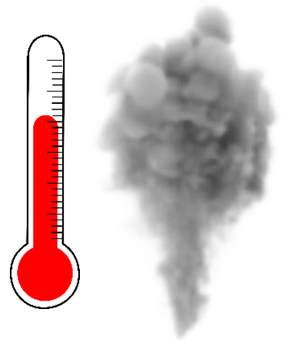
Inspection and servicing

Clause 45.4 Recommendations for inspection and test of the system over a 12 month period

j) Multi-sensor detectors should be operated by a method that confirms that products of combustion in the vicinity of the detector can reach the sensors and that a fire signal can be produced as appropriate.



CO

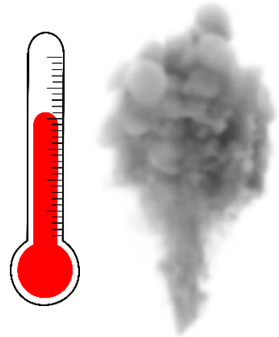
1) The guidance of the manufacturer on the manner in which the detector can be functionally tested effectively should be followed.
2) Multi-sensor fire detectors should be physically tested by a method that confirms that products of combustion in the vicinity of the detector can reach the sensors and that the appropriate response is confirmed at the CIE.

Inspection and servicing

Clause 45.4 Recommendations for inspection and test of the system over a 12 month period

3) Where the detector or system design permits, each sensor on which a fire detection decision depends (e.g. smoke, heat, CO) should be physically tested individually. Alternatively, individual sensors may be physically tested together if the detection system design allows simultaneous stimuli and individual sensor responses to be verified either individually or collectively.

4) On completion of tests the system should be returned to its normal configuration



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Inspection and servicing

Clause 45.4 Recommendations for inspection and test of the system over a 12 month period

o) The cause and effect programme should be confirmed as being correct by activating at least one cause and observing the operation of the effects.
Where there are different types of devices (e.g. manual call points and automatic fire detectors), one cause and its effects should be tested for each type of device.

Inspection and servicing

Clause 45.4 Recommendations for inspection and test of the system over a 12 month period.

q) A check should be made to determine whether a suitable zone plan (or other suitable diagrammatic representation) of the premises is provided on or adjacent to all CIE and repeat indicating equipment.

NOTE 12 *Where repeat indicating equipment relates to only part of the premises, the adjacent zone plan need only relate to that part of the premises.*

Inspection and servicing

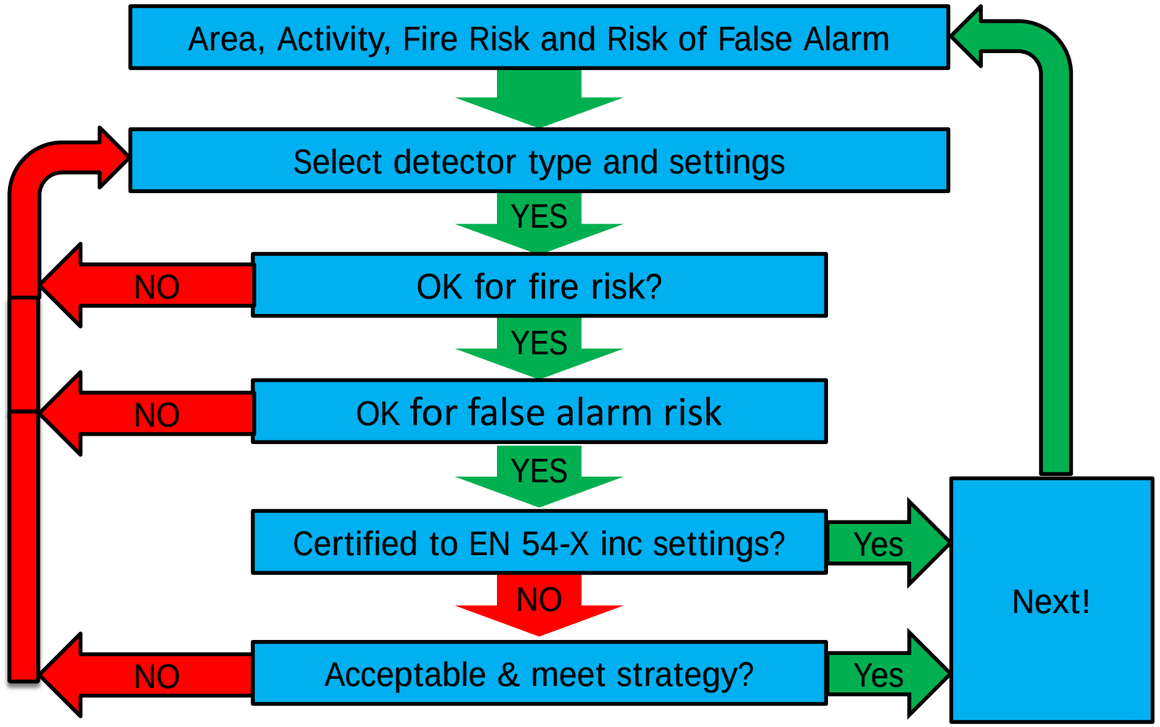
Clause 45.4 Recommendations for inspection and test of the system over a 12 month period

s) Video fire detectors should be subject to the manufacturer's guidelines in relation to annual test and inspection.

Any lighting provided specifically to aid the detection of flame or smoke should be regarded as an integral part of the video fire detection system.

As such, its correct operation should be confirmed, both in the presence of any mains supply to the lighting and the absence of such a supply.

Annex E The selection and application of fire detectors



To record the rational behind the initial selection of a type of device and any setting selected to enable service engineers in the future to decide if a device may be changed due to changes in site conditions etc.

Table E.2 Example Fire Risks

Fire Industry Association

Fire Hazard	Example Fire	Ionization	Optical	CO	Heat	Flame	Optical - Heat	Optical - Heat - CO
White smoke	Smoulder electrical	**	*****	*	*	*	*****	*****
White smoke	Smoulder wood	***	*****	****	*	*	*****	*****
Dark smoke	Smoulder furnishing	**	****	*****	*	*	****	*****
Smoulder > flame	Waste paper bin	****	****	**	**	***	****	****
Flaming clean	Burning solvents	*	*	*	***	*****	***	****
Flaming dirty	Burning oils	**	***	**	***	*****	****	****

Very Good = *****, Good = ****, Moderate = ***, Poor = **, Very Poor = *

Table E.3 Avoiding False Alarms

Fire Industry Association

Phenomena	False alarm	Ionization	Optical	CO	Heat	Flame	Optical - Heat	Optical - Heat - CO
Steam	Shower	****	**	*****	*****	*****	***	***
Smoke	Kitchen	*	***	****	*****	*****	***	****
Dust	Warehouse	***	**	*****	*****	*****	***	***
Other	Aerosol	*	*	*****	*****	*****	***	****
High air flow	Air Condition	**	*****	*****	*****	*****	*****	*****
Thermal change	Opening ovens	**	*****	*****	*	*****	****	****

Very Good = *****, Good = ****, Moderate = ***, Poor = **, Very Poor = *

The selection and application of fire detectors

Excel Spread sheet also available for members to download

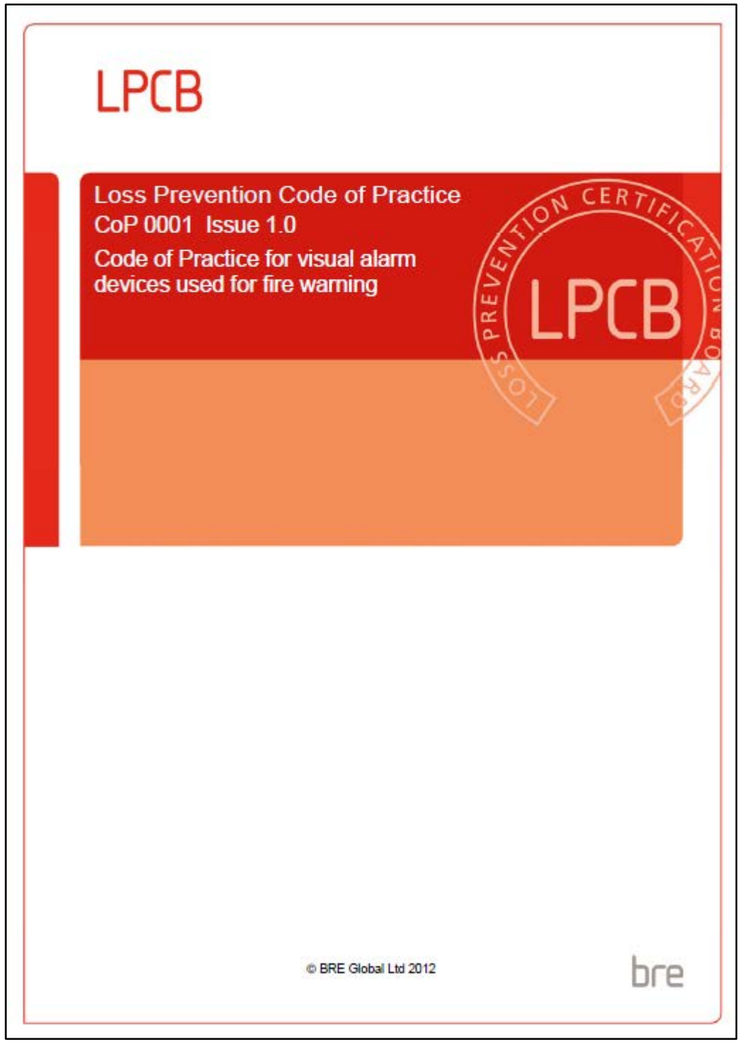
Annex F Visual alarm device illumination characteristics

Fire Industry Association

Table F.1 Minimum rating for ceiling-mounted VADs in square rooms with direct viewing and ambient light correction

Max. room size	VAD mounting height	Uncorrected BS EN 54-23 VAD rating required	Ambient light level (lux)							
m × m	m	(e.g. C-x-y)	<100	100 to 200	200 to 300	300 to 400	400 to 500	500 to 600	600 to 700	700 to 800
2 × 2	3	C-3-2.8	C-3-1	C-3-1.2	C-3-1.5	C-3-2	C-3-2.6	C-6-3.2	C-6-4	C-6-5.6
3 × 3		C-3-4.2	C-3-1.5	C-3-1.8	C-3-2.3	C-3-3	C-3-3.9	C-6-4.7	C-6-6	C-6-8.4
4 × 4		C-3-5.6	C-3-2	C-3-2.4	C-3-3	C-3-4	C-3-5.1	C-6-6.3	C-6-8	C-6-11.2
5 × 5		C-3-7	C-3-2.5	C-3-3	C-3-3.7	C-3-5	C-3-6.4	C-6-7.8	C-6-10	C-6-14
10 × 10		C-3-14	C-3-5	C-3-5.9	C-3-7.4	C-3-10	C-3-12.8	C-6-15.6	C-6-20	C-6-28
15 × 15		C-3-21	C-3-7.5	C-3-8.8	C-3-11.1	C-3-15	C-3-19.1	C-6-23.4	C-6-30	C-6-42
2 × 2	6	C-6-2.8	C-3-1	C-3-1.2	C-6-1.5	C-6-2	C-6-2.6	C-9-3.2	C-9-4	(O)-12-5.6
3 × 3		C-6-4.2	C-3-1.5	C-3-1.8	C-6-2.3	C-6-3	C-6-3.9	C-9-4.7	C-9-6	(O)-12-8.4
4 × 4		C-6-5.6	C-3-2	C-3-2.4	C-6-3	C-6-4	C-6-5.1	C-9-6.3	C-9-8	(O)-12-11.2
5 × 5		C-6-7	C-3-2.5	C-3-3	C-6-3.7	C-6-5	C-6-6.4	C-9-7.8	C-9-10	(O)-12-14
10 × 10		C-6-14	C-3-5	C-3-5.9	C-6-7.4	C-6-10	C-6-12.8	C-9-15.6	C-9-20	(O)-12-28
15 × 15		C-6-21	C-3-7.5	C-3-8.8	C-6-11.1	C-6-15	C-6-19.1	C-9-23.4	C-9-30	(O)-12-42
2 × 2	9	C-9-2.8	C-6-1	C-6-1.2	C-6-1.5	C-9-2	C-9-2.6	(O)-10-3.2	(O)-12.9-4	(O)-18-5.6
3 × 3		C-9-4.2	C-6-1.5	C-6-1.8	C-6-2.3	C-9-3	C-9-3.9	(O)-10-4.7	(O)-12.9-6	(O)-18-8.4
4 × 4		C-9-5.6	C-6-2	C-6-2.4	C-6-3	C-9-4	C-9-5.1	(O)-10-6.3	(O)-12.9-8	(O)-18-11.2
5 × 5		C-9-7	C-6-2.5	C-6-3	C-6-3.7	C-9-5	C-9-6.4	(O)-10-7.8	(O)-12.9-10	(O)-18-14
10 × 10		C-9-14	C-6-5	C-6-5.9	C-6-7.4	C-9-10	C-9-12.8	(O)-10-15.6	(O)-12.9-20	(O)-18-28
15 × 15		C-9-21	C-6-7.5	C-6-8.8	C-6-11.1	C-9-15	C-9-19.1	(O)-10-23.4	(O)-12.9-30	(O)-18-42

NOTE Devices rated as (O)-x-y in the table exceed the height of a ceiling VAD as specified in BS EN 54-23:2010. The rating describes an equivalent "O" rated device with a minimum height value of x and a minimum diameter value of y.



Thank you for your attention

Any questions?