BS 7273-6:2019

BSI Standards Publication

Code of practice for the operation of fire protection measures

Part 6: Fire detection and fire alarm systems – Interface with ancillary systems and equipment

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Published by BSI Standards Limited 2019

ISBN 978 0 580 99789 1

ICS 13.220.20

The following BSI references relate to the work on this document:
Committee reference FSH/12/4
Draft for comment 19/30372523 DC

Amendments/corrigenda issued since publication

Date	Text affected

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Foreword

Publishing information

This part of BS 7273 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 August 2019. It was prepared by Subcommittee FSH/12/4, *Automatic operation of fire protection*, under the authority of Technical Committee FSH/12, *Fire detection and alarm systems*. A list of organizations represented on these committee can be obtained on request to their secretary.

Relationship with other publications

BS 7273 is published in six parts:

- Part 1: *Electrical actuation of gaseous total flooding extinguishing systems*;
- Part 2: *Mechanical actuation of gaseous total flooding and local application extinguishing systems*;
- Part 3: *Electrical actuation of pre-action watermist and sprinkler systems*;
- Part 4: *Actuation of release mechanisms for doors*;
- Part 5: *Electrical actuation of watermist systems (except pre-action systems)*;
- Part 6: *Fire detection and fire alarm systems – Interface with ancillary systems and equipment.*

Information about this document

This is a new part of the BS 7273 series.

This publication can be withdrawn, revised, partially superseded or superseded. Information regarding the status of this publication can be found in the Standards Catalogue on the BSI website at bsigroup.com/standards, or by contacting the Customer Services team.

Where websites and webpages have been cited, they are provided for ease of reference and are correct at the time of publication. The location of a webpage or website, or its contents, cannot be guaranteed.

Use of this document

As a code of practice, this part of BS 7273 takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this part of BS 7273 is expected to be able to justify any course of action that deviates from its recommendations.

It has been assumed in the preparation of this part of BS 7273 that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Competence of organizations involved in the design and installation of ancillary systems and equipment can be assured by the use of organizations that are third-party certificated, by a UKAS-accredited certification body, to carry out such activities.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. "organization" rather than "organisation").

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 British Standard cannot confer immunity from legal obligations.

1 Scope

This part of BS 7273 gives recommendations for the design, installation, commissioning and maintenance of interface arrangements between fire detection and fire alarm systems conforming to BS 5839-1:2017 and various ancillary systems and equipment (ASE), where this interface is required by the fire strategy for a building, excluding the interface with those systems covered in other parts of the BS 7273 series.

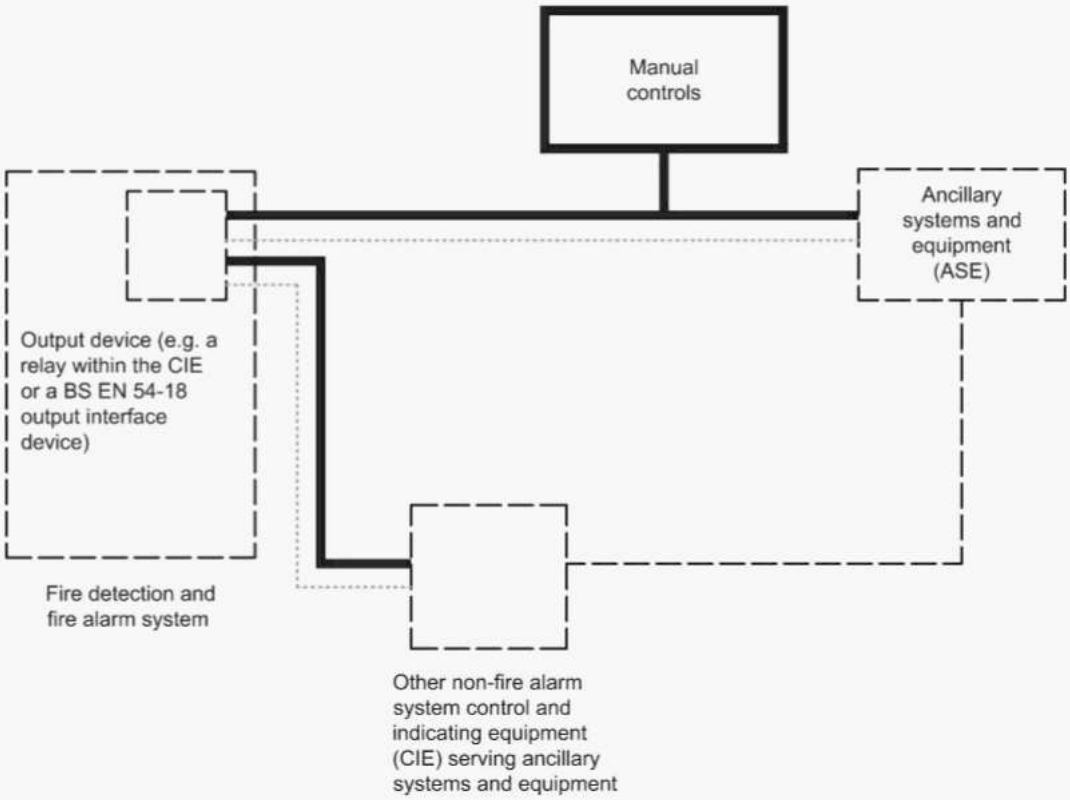
Arrangements covered by this part of BS 7273 include the interface between fire detection and fire alarm systems and:

- smoke control systems;
- lifts and other lifting appliances;
- gas valves;
- fire-resisting shutters and active fire curtain barrier assemblies;
- electricity supplies;
- ventilation systems;
- lighting, intelligent signage and wayfinding; and
- paging systems.

This part of BS 7273 does not apply to the interface between ASE contained solely within a private dwelling and the fire detection and fire alarm system within that dwelling. It applies to systems installed in the common parts of blocks of flats (e.g. activation of the smoke control system), and where the actuation of the detection within a dwelling is intended to interact with a system within common parts (such as in sheltered housing).

The scope of this part of BS 7273 is shown diagrammatically in Figure 1.

Figure 1 — *Scope of BS 7273-6*



Key

Within the scope of this part of BS 7273

Outside the scope of this part of BS 7273

Status monitoring (optional: see Clause 5)

NOTE 1 Any special recommendations for provision and siting of fire detectors and manual call points are within the scope of this part of BS 7273.

NOTE 2 The effect of failures of power supply for the devices is within the scope of this part of BS 7273.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions of this document[1]. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 5266-1, *Emergency lighting — Part 1: Code of practice for the emergency lighting of premises*

BS 5839-1:2017, *Fire detection and fire alarm systems for buildings — Part 1: Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises*

BS 6724, *Electric cables — Thermosetting insulated, armoured cables of rated voltages of 600/1 000 V and 1 900/3 300 V for fixed installations, having low emission of smoke and corrosive gases when affected by fire — Specification*

BS 7346-8, *Components for smoke control systems — Part 8: Code of practice for planning, design, installation, commissioning and maintenance*

BS 7671, *Requirements for Electrical Installations — IET Wiring Regulations*

1 Documents that are referred to solely in an informative manner are listed in the Bibliography.

BS 7846, *Electric cables — Thermosetting insulated, armoured, fire-resistant cables of rated voltage 600/1 000 V for fixed installations, having low emission of smoke and corrosive gases when affected by fire — Specification*

BS 9999, *Fire safety in the design, management and use of buildings — Code of practice*[2]

BS EN 54-4, *Fire detection and fire alarm systems — Part 4: Power supply equipment*

BS EN 1838, *Lighting applications — Emergency lighting*

BS EN 12101 (all parts), *Smoke and heat control systems*

BS EN 50172 (BS 5266-8), *Emergency escape lighting systems*

BS EN 60702-1, *Mineral insulated cables and their terminations with a rated voltage not exceeding 750 V — Part 1: Cables*

ETSI EN 300 220-1, *Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz — Part 1: Technical characteristics and methods of measurement*

ETSI EN 300 220-2, *Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz — Part 2: Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU for non-specific radio equipment*

ETSI EN 300 224, *Land Mobile Service — Radio equipment for use in a paging service operating within the frequency range 25 MHz – 470 MHz — Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU*

3 Terms and definitions

For the purposes of this part of BS 7273, the following terms and definitions apply.

3.1 cause and effect

relationship between one or more events

NOTE The "cause" gives rise to, or triggers, one or more other events, and the "effect" is the consequence of those events.

3.2 circuit

assembly of components supplied from a single source and protected against overcurrent by the same protective device(s) or current limitation arrangements

3.3 coincidence

arrangement designed such that an output is obtained only when at least two independent input triggering signals are present at the same time

NOTE For example, an output suitable for triggering ASE is obtained only after a detector has detected a fire, and at least one other independent detector covering the same protected space has confirmed the existence of fire.

3.4 commissioning

process by which it is determined that the installed system meets the appropriate requirements

2 This part of BS 7273 gives informative references to BS 9999:2017.

3.5 competent person

person with the relevant current training and experience, and with access to the requisite tools, equipment and information, and capable of carrying out a defined task

[SOURCE: BS 5839-1:2017, 3.12]

3.6 control and indicating equipment (CIE)

component(s) of a fire detection and fire alarm system through which other components are supplied with power

3.7 critical signal path

all interconnections and communications between a fire detection and fire alarm system and the input terminals on or within ASE, or between CIE and other control equipment by which ASE is controlled (see Figure 1)

3.8 fail-safe

designed such that specified failures result in the same action as a fire signal

3.9 fire signal

signal intended to indicate the occurrence of a fire

3.10 fire strategy

set of fire safety objectives and the measures to be taken to meet those objectives

3.11 installer

person or organization having responsibility for all or part of the process of installing the measures to which this standard relates

3.12 maintenance

work of inspection, servicing and repair necessary in order to maintain the efficient operation of the measures to which this standard relates

3.13 manual call point

component of a fire detection and fire alarm system that is used for the manual initiation of an alarm

3.14 paging system

system interfaced to the fire alarm CIE to provide automatic transmission of encoded data, usually in the form of alphanumeric messages, to fixed, mobile or portable receiving devices to alert individuals or a group of individuals to a fire or other event

NOTE Although not exclusively, this is normally by radio transmission means to portable pocket receivers, mobile desktop terminals or fixed displays.

3.15 pre-alarm warning

early warning of conditions which might (or might not) represent a fire

3.16 protection

presence of one or more automatic fire detector(s) able to initiate actions needed for the safety of life or property in the event of a fire and for triggering of a change of state in ASE

3.17 radio-actuated system

ASE that is activated wirelessly by means of an encoded radio transmission initiated by a trigger (e.g. a relay output) from the fire detection and fire alarm system CIE, causing a corresponding radio receiver to decode and activate a switched output to the ASE

3.18 servicing

routine process of work on the measures to which this standard relates, carried out at predetermined intervals

3.19 staff alarm

restricted alarm, following the operation of a manual call point or automatic fire detector, given to certain staff in the premises to permit investigation prior to evacuation and/or summoning of the fire and rescue service

3.20 stakeholder

party with an interest in the system

NOTE The interest might be:

- *financial, e.g. owner or insurance company;*
- *as a customer (internal or external);*
- *as an enforcing authority, e.g. building control body, fire and rescue authority;*
- *in a professional capacity as an adviser to one of the parties, e.g. architect, fire engineer, building service engineer; or*
- *in a contractual capacity, e.g. a manufacturer, installer or maintainer of equipment.*

4 General recommendations for interface connections

*COMMENTARY ON CLAUSE **4***

Interfacing is required when a fire detection and fire alarm system is connected to ASE. Common applications for such interfaces are described in Annex A.

It is necessary to ensure that the two systems or equipment do not jeopardize each other through electrical interference or loading effects. The power taken by the other equipment needs to be accounted for by providing sufficient power capacity, providing additional power supplies or ensuring that the interconnection does not allow excessive loading.

It is likely that the ASE will need to be tested regularly to verify that it is operating correctly. There might need to be disablement facilities to prevent the ASE from being operated during regular testing of the fire detection and fire alarm system and test facilities, to allow the organization responsible for the ASE to activate the ASE from the fire detection and fire alarm system at appropriate times of regular servicing.

In some cases, it might not be practicable to test the ASE regularly. In these cases, it might be necessary to be able to confirm connection to the ASE and to confirm that the ASE is capable of operating correctly, e.g. by verifying that the transmission path is fault-free and that the necessary power supplies are operating correctly.

In some cases, it might be necessary to ensure that the interface between the systems is fail-safe, i.e. that in the event of one of the systems failing to be able to operate, the output operates automatically to place the interfaced ASE into a safe state (normally, the same state as initiated by a fire signal).

Some fire detection and fire alarm systems can provide a pre-alarm warning. This warning is primarily intended to enable investigation of conditions that might give rise to a false alarm. It is not normally appropriate, therefore, for a change of state of ASE to be actuated in the event of a pre-alarm warning, unless that is the intended function of the ASE.

*Recommendations for electromagnetic compatibility and electrical safety are given in Clause **17**, Clause **18** and BS 5839-1:2017, Clause **9**.*

The following recommendations should be met.

a) Where it is necessary for the fire detection and fire alarm system to provide power to operate ASE, in the quiescent or the alarm state, the power requirements should be quantified and provision should be made by specifying the appropriate rating for the fire detection and fire alarm system power supply or by providing an ancillary power supply.

b) When interfacing a fire detection and fire alarm system to ASE, means should be provided to test the respective systems or equipment during regular maintenance.

c) Where it is not practicable regularly to activate the ASE, the interconnection should be monitored and means should be provided to monitor the ASE to determine whether it is available. Fault indications should be given on the fire detection and fire alarm system if the ASE is disabled, disconnected or powered down, such that it is not able to operate.

d) Where it is not desired to activate the ASE during regular testing of the fire detection and fire alarm system, means should be provided to disable the interface between the systems. In this case, an indication should be given at the fire alarm CIE to indicate that the interface is disabled.

e) Where operation of ASE is critical for safety in case of fire, the interface to the ASE should fail in a safe condition, taking into account the cause and effect of the ASE.

f) The fire strategy for the building should define the circumstances in which a signal should be transmitted from the fire detection and fire alarm system to the ASE.

NOTE In some cases, it might be necessary for a signal to be sent to the ASE on pre-alarm detection before there is a confirmed fire condition.

5 Status monitoring

*COMMENTARY ON CLAUSE **5***

In the case of certain ASE, it is possible, and might be desirable, for the status of the system to be monitored at the fire detection and fire alarm system CIE. This could include monitoring of the ASE so that a fault in the ASE is indicated at the CIE. In addition, or alternatively, monitoring could include an arrangement whereby the successful change of state of the ASE in response to a signal from the fire detection and fire alarm system is confirmed at the CIE.

Status monitoring is not necessary for compliance with this part of BS 7273. However, a user or designer might wish to incorporate status monitoring (e.g. in a complex building with a fire control room and ASE that is critical to the fire strategy for the building). In addition, status monitoring might be necessary at the control equipment of certain ASE. For example, in the case of a smoke control system, the status of dampers in a smoke shaft is monitored at the control equipment of the smoke control system.

The following recommendations should be met.

a) Any requirements for status monitoring should be agreed amongst the relevant stakeholders at the design stage of an interface between the fire detection and fire alarm system and ASE (see Clause **6**).

b) The design of status monitoring should be such that the reliability in transmission to, and receipt of fire signals at, ASE is not reduced by the transmission of any status signal from the ASE to the CIE.

6 Exchange of information and definition of responsibilities

*COMMENTARY ON CLAUSE **6***

The design of the interface between the fire detection and fire alarm system and the ASE could be undertaken by the supplier, the installer, representatives of the user or purchaser (including consultants), or by a combination of these parties.

The following recommendations should be met.

a) The designer of the actuation arrangements should ensure that, to the extent appropriate, there is consultation at the design stage with the following stakeholders:

- the user or purchaser;
- the building control body;
- consultants (including architects, mechanical and electrical consultants, and fire engineering consultants);
- authorities having jurisdiction (AHJs); and
- any relevant specialists in respect of the ASE (e.g. the fire alarm contractor).

b) Responsibility for the design of the interface between the fire detection and fire alarm system and the ASE, including the interconnections, should be clearly defined.

NOTE 1 This is often the designer of the fire detection and fire alarm system.

c) Where the interface between ASE and a fire detection and fire alarm system is the responsibility of an organization other than the installer of the fire detection and fire alarm system, the responsibility of that organization and any other organization, such as the fire alarm installer, should be clearly defined and documented.

d) Where the fire strategy specifies a particular actuation arrangement, as part of the cause and effect of the fire detection and fire alarm system, the details of the actuation arrangements, as well as the cause and effect schedule, should be documented within the fire safety information for the building.

NOTE 2 In England and Wales, Regulation 38 of the Building Regulations 2010 [1] requires that fire safety information is provided to the responsible person not later than the date of completion of the work, or the date of occupation of the building or extension, whichever is the earlier. In Scotland, the Building (Procedure) (Scotland) Regulations 2004 [2] require that a fire safety design summary, incorporating information on services and equipment installed in the building, is provided along with the completion certificate to the building control verifier. There is no equivalent requirement in Northern Ireland.

e) The information within the fire safety documentation for the building, regarding the actuation and cause and effect arrangements, should enable the building user to understand the cause and effect schedule together with any supporting reasoning. The following documents should be included within the fire safety information:

- where there is a variation in the actuation arrangement from the recommendations of this, or any other, British Standard, justification for the variation;
- the actuation arrangement upon receipt of a specified signal from the fire detection and fire alarm system;

- the actuation arrangement upon loss of power supply;
- clarification of the definition of "fail-safe" if this is to refer to any other aspects other than fire (e.g. security arrangements);
- any consequences for the building in the event that the actuation or the cause and effect arrangements fail to operate as designed; and
- confirmation that the arrangements have been agreed with the relevant stakeholders.

7 Variations from the recommendations of this standard

*COMMENTARY ON CLAUSE **7***

In some circumstances, variations from the recommendations of this standard might be appropriate.

The following recommendations should be met.

a) Variations should be the subject of specific agreement amongst all stakeholders and should be clearly identified in all relevant system documentation (e.g. within a specification or design proposal), so that they are obvious to relevant stakeholders.

b) Any variations identified or proposed during installation or commissioning, but not clearly identified in the documented design, should be documented for subsequent approval (other than in the case of errors or snags for which rectification is proposed). This recommendation is not intended to imply that design of the actuation arrangements is necessarily the responsibility of the installer or commissioning engineer. However, if variations are identified by an installer or commissioning engineer, particularly variations that were not explicit within a specification, they should be documented for referral to the designer, user or purchaser for agreement or action.

c) All variations from the recommendations of this standard should be listed in the relevant commissioning certificate (see Clause **19**).

8 Smoke control systems

*COMMENTARY ON CLAUSE **8***

Smoke control systems are used in a very broad range of applications and include smoke and heat exhaust ventilation systems used in buildings, ranging from warehouses to shopping centres, and pressure differential systems used to safeguard staircases and escape routes for people escaping from fire as well as firefighters tackling the fire. These systems can be designed for property protection or life safety or both.

There can often be very specific and complicated cause and effect logic associated with the operation of these systems. For protection of life, a high degree of reliability of the interface is required, and it is vital that the operation of outputs to smoke control systems is proven at commissioning to ensure that the cause and effect logic is correctly programmed in accordance with the design specification. Oversimplification of such interfaces can potentially lead to a loss of fire separation between compartments, seriously undermining the building's overall fire safety strategy. For example, in the case of smoke shafts, care needs to be taken to ensure that the fire detection and fire alarm system does not overrule the logic of the smoke control system.

*Guidance on smoke control systems is given is BS 9991:2015, Clause **14**, BS 9999:2017, Clause **27**, and BS 7346-8.*

Attention is drawn to the Construction Products Regulation 2018 [3] in respect of the legal requirement for CE marking of components of smoke control systems.

The following recommendations should be met.

a) In accordance with BS 7346-8, the smoke control system design should include as a minimum:

   1) the design criteria;

   2) a cause and effect schedule;

   3) a description of operation; and

   4) a schematic.

   *NOTE 1 An interface between the fire detection and fire alarm system and the smoke control system is not recommended without this information being available (see Clause **4**).*

b) After installation, operation of the system should be tested against the cause and effect schedule in accordance with BS 7346-8. In particular, it should be confirmed that, for each potential fire signal, all system components are in their correct post-initiation positions (both in the area of fire origin and in all other areas) (see also Clause **19**).

c) Where a fire detection system does not incorporate means to test manually a smoke control system or equipment (such as automatically opening vents) (e.g. as is normally the case in blocks of flats or maisonettes), test facilities should be provided that simulate operation of a fire detector.

   NOTE 2 The purpose of such test facilities is to enable routine testing of the interface between the fire detection and fire alarm system and the smoke control system or equipment by the user without the need to test-operate any fire detector.

   NOTE 3 Where, for example, the cause and effect of each fire detector or zone is different, the facilities need to enable simulation of operation of each individual detector or zone separately.

d) Components of smoke control systems should conform to the relevant part(s) of BS EN 12101.

9 Lifts and other lifting appliances

*COMMENTARY ON CLAUSE **9***

The recommendations in this clause cover interfaces with the following types of lifts which fall under the scope of BS EN 81-20:

- *lifts within the scope of BS EN 81-73, provided with automatic recall means from a fire detection and fire alarm system, which are not intended to stay in operation in the event of fire;*
- *firefighters lifts within the scope of BS EN 81-72; and*
- *evacuation lifts as described in BS 9999:2017, Annex G.*

In addition, there are recommendations for the following types of lifting appliances falling outside the scope of BS EN 81-20:

- *vertical lifting appliances with enclosed carrier intended for use by persons, including persons with disability (these have rated speed not greater than 0.15 m/s and are within the scope of prEN 81-42); and*
- *lifting platforms within the scope of BS EN 81-41.*

It is assumed that the following have been decided as part of the building fire strategy:

- *which lifts or other lifting appliances need to be taken out of use on operation of the fire detection and fire alarm system; and*
- *which lifts need to be available only for use by specific groups of people (e.g. by firefighting personnel or for the evacuation of disabled people) on operation of the fire detection and fire alarm*

system or operation of a manual control, in which case the lift is normally called to a designated exit floor(s).

9.1 General

The following should be defined as part of negotiation between the building designer, the system designer and the lift or lifting appliance provider (see Clause **6**):

- the use and operation of any lift or lifting appliance in response to an input from a fire detection and fire alarm system;
- the signals required from the fire detection and fire alarm system to the lift or lifting appliance controls; and
- the interface specification for signals between the fire detection and fire alarm system and the lift or lifting appliance controls.

9.2 Passenger lifts not intended to stay in operation in the event of fire

*COMMENTARY ON **9.2***

Lifts conforming to BS EN 81-73 that are intended to be recalled and removed from service might be provided with an automatic recall signal to facilitate the return of the lift to a designated exit floor(s), to allow passengers to escape and then for the lift to be taken out of service.

The recommendations in **9.1** should be met.

The provision of automatic recall signal(s) to the designated exit floor(s) should be agreed as part of negotiation between the building designer, the system designer and the lift provider.

9.3 Firefighters lifts

*COMMENTARY ON **9.3***

Firefighters lifts conforming to BS EN 81-72 might be provided with an automatic recall signal to facilitate the return of the lift to the fire and rescue service access level, to allow passengers to escape and then for the lift to be taken out of service pending the arrival of the fire and rescue service. The lift is then taken into firefighters' service by the use of the firefighters lift switch. Where the building has a fire detection system, a signal from this is used to recall the firefighters lift.

The recommendations in **9.1** should be met.

The provision of an automatic recall signal to the fire and rescue service access level should be agreed as part of negotiation between the building designer, the system designer and the firefighters lift provider.

9.4 Evacuation lifts

*COMMENTARY ON **9.4***

Evacuation lifts in accordance with BS 9999:2017 are intended for the assisted evacuation of disabled people and those with impaired mobility.

Evacuation lifts might be provided with an automatic recall signal to facilitate the return of the lift to the final exit storey, to allow passengers to escape and then for the lift to be taken out of service pending the arrival of an evacuation lift operator. The lift is then taken into evacuation control by the use of the evacuation lift switch. Where the building has a fire detection system, a signal from this is used to recall the evacuation lift.

An evacuation lift may be taken out of evacuation service using a suspend evacuation service signal, by returning it to the exit floor in the event that a fire is detected close to the evacuation lift or in the fire-protected lobbies.

The recommendations in **9.1** should be met.

The following should be agreed as part of negotiation between the building designer, the system designer and the evacuation lift provider, and provisions made accordingly:

- whether an automatic recall signal is to be provided; and
- whether a suspend evacuation service signal is to be provided.

9.5 Vertical lifting appliance with enclosed carrier intended for use by persons, including persons with disability

*COMMENTARY ON **9.5***

These lifting appliances are similar to passenger lifts except that they have a rated speed not greater than 0.15 m/s.

Where there is a suitable fire detection and fire alarm system, the recommendations in **9.2** should be met for the lifting appliance.

9.6 Lifting platforms

*COMMENTARY ON **9.6***

BS EN 81-41 does not specify the manner in which a lifting platform is required to perform in response to a fire alarm signal. This leaves a risk of entrapment of lifting platform users. Subject to risk assessment, this risk could be addressed by a lifting platform within the scope of BS EN 81-41 operating as follows where an interface is available to provide a fire signal from a fire detection and fire alarm system.

- *If the lifting platform is at a landing level, then the door would be unlocked and there would be no further movement of the lifting platform until the fire signal is reset.*
- *If the lifting platform is above the exit floor and not in an unlocking zone, then it could be permissible for the lifting platform to move downwards to the exit floor in response to the fire signal. The lifting platform down control button and stop controls would remain enabled. On arrival at the exit floor, the door would then be unlocked and no further movement of the lifting platform would take place.*
- *If the lifting platform is not at a landing level (i.e. not within the unlocking zone), then the platform controls could be used to move to the next landing where the door would be unlocked, and then no further movement of the lifting platform would be possible.*

The recommendations in **9.1** should be met.

In addition, the building designer should justify the operation of the lifting platform through risk assessment (e.g. on the basis of the commentary above).

10 Gas valves

*COMMENTARY ON CLAUSE **10***

It is possible to interface a fire detection and fire alarm system with a gas supply, such that the gas supply is isolated via a gas safety shut-off valve (SSOV) on detection of fire. At the time of publication of this part of BS 7273, there are no legislative requirements that necessitate such an interface, nor are there recommendations in any British Standard in this respect. However, a fire strategy for a building might incorporate an arrangement whereby a gas supply is shut off, via an SSOV, on detection of fire.

The arrangement might be restricted to the cause and effect of specific fire detectors (e.g. within a gas intake room) or, in the case of small premises (e.g. a fast food outlet), might be such that gas is shut off on operation of any fire detector or manual call point in the premises.

All gas installations are required to be provided with emergency controls, to which there is adequate access. In catering establishments with gas cooking equipment, an electrically operated manual control is commonly provided (usually in addition to a lever-operated or similar control) to enable staff to isolate the gas supply to the cooking equipment in the event of fire. For reasons of health and safety, it is also normally required that the gas is shut off automatically in the event of failure of the catering extraction system.

The above facilities can be arranged by means of a gas interlock panel, with which, if required, there can be an interface with the fire detection and fire alarm system. However, care is necessary to ensure that the arrangement of this interface does not reduce the reliability of any other arrangement for manual or automatic isolation of the gas supply.

Attention is drawn to the Gas Safety (Installation and Use) Regulations 1998 [4].

An SSOV is designed to fail safe, in that, on failure of the power supply to the SSOV, the valve closes, isolating the supply of gas. The designer needs to determine whether it is necessary for the interface with the fire detection and fire alarm system to be similarly fail-safe (e.g. such that, on total power failure of the fire detection and fire alarm system, or, in the event of an open or short circuit on cables, the gas supply is isolated). In this connection, it is necessary to determine the likelihood of faults, the criticality of the interface, the extent of disruption that could arise in the event of a fault, and the arrangements for fault monitoring (i.e. whether a fault warning would be given on failure of the interface).

The following recommendations should be met.

a) The design of any interface between a fire detection and fire alarm system and a gas SSOV should be such that the interface cannot affect the reliability of any other means for isolation of the gas supply by means of the SSOV.

b) Any specification for an interface should clearly specify whether the interface is to fail safe (i.e. whether the gas supply is to be isolated) in the event of specified, foreseeable faults, including total loss of power to the fire detection and fire alarm system, and open- or short-circuit faults on any cable between the CIE and the SSOV (or, alternatively, between the CIE and any gas interlock panel).

c) Any specification for an interface should clearly specify (e.g. by means of a cause and effect schedule) the devices (fire detectors and/or manual call points) which, on operation, are required to cause isolation of the gas supply.

   NOTE 1 Unnecessary disruption might arise if the extent of these devices is not appropriately limited.

   NOTE 2 Where significant disruption might arise in the event of a false alarm, it might be appropriate to adopt a coincidence arrangement unless isolation of the gas supply occurs only on operation of a heat detector and/or manual call point.

d) Any specification for an interface should clearly specify whether monitoring of the interface circuitry is required.

NOTE 3 A facility may be provided for isolation of the interface between the fire detection and fire alarm system and the SSOV, to enable testing of the fire detection and fire alarm system to be carried out without isolation of the gas supply.

11 Fire-resisting shutters and active fire curtain barrier assemblies

*COMMENTARY ON CLAUSE **11***

Fire-resisting shutters and active fire curtain barrier assemblies are commonly used to maintain the compartmentation and fire separation of buildings by closing the opening across which they are installed, thereby limiting the size and spread of fire. Furthermore, they can be used to control the spread of fire effluent to protect escape routes, both vertically and horizontally, limiting smoke movement in the structure forming these routes, e.g. protected corridors and protected shafts.

Both vertical fire-resisting shutters and active fire curtain barrier assemblies can be deployed by a gravity system. Only fire-resisting shutters and horizontal fire curtain barrier assemblies can be deployed by a mechanically driven arrangement; such mechanical arrangements would require dual power supplies.

Active fire curtain barrier assemblies can often be used either as part of a smoke control and smoke management system within a building, or to form part of the means of escape arrangements for the building.

Fire-resisting shutters and active fire curtain barrier assemblies commonly close openings in a controlled manner, either on local detection of fire (i.e. within the immediate vicinity of the shutter/curtain), or on general detection of fire (i.e. anywhere in the building). Moreover, such systems are typically interfaced to deploy fail-safe closed.

Often, fire-resisting shutters and active fire curtain barrier assemblies are provided with a retract function, enabling the fire-resisting shutters and active fire curtain barrier assemblies to be withdrawn.

*Further guidance on fire-resisting shutters can be found in BS 9999:2017, **32.2**, and on active fire curtain barrier assemblies in BS 9999:2017, **32.3,** and BS 8524-2.*

The following recommendations should be met.

a) In buildings in which a Category L1, L2 or L3 system is present, no special arrangements for the design of the fire detection and fire alarm system are normally necessary; the selection, provision and siting of automatic fire detectors is expected to be sufficient. In such buildings, fire-resisting shutters and active fire curtain barrier assemblies should deploy on activation of the fire detection and fire alarm system, either within the adjacent space on each side of the fire-resisting shutters and active fire curtain barrier assemblies, or generally within the building.

b) In buildings in which a Category M/L5 or L4 system is present, the selection, provision and siting of automatic fire detectors should meet the following recommendations, depending upon the intended function of the fire-resisting shutters and active fire curtain barrier assemblies.

   1) Where fire-resisting shutters and active fire curtain barrier assemblies are provided to maintain fire compartmentation and/or fire separation only, at least one automatic fire detector should be located on each side of the shutters or active fire curtain barrier assemblies, such that, on each side, no parts of the shutters or active fire curtain barrier assemblies are more than 7.5 m (measured horizontally) away from an automatic fire detector.

      NOTE 1 In this case, the shutters and active fire curtain barrier assemblies are not designed to afford any protection against smoke migration (i.e. are not provided for protection of escape routes); see b)2).

   2) Where fire-resisting shutters and active fire curtain barrier assemblies are provided to maintain protection of an escape route, such as a protected lobby or protected escape corridor, from smoke migration, at least one automatic fire detector should be located on

each side of the shutters or active fire curtain barrier assemblies, such that, on each side, no parts of the shutters or active fire curtain barrier assemblies are more than 1.5 m (measured horizontally) away from an automatic fire detector.

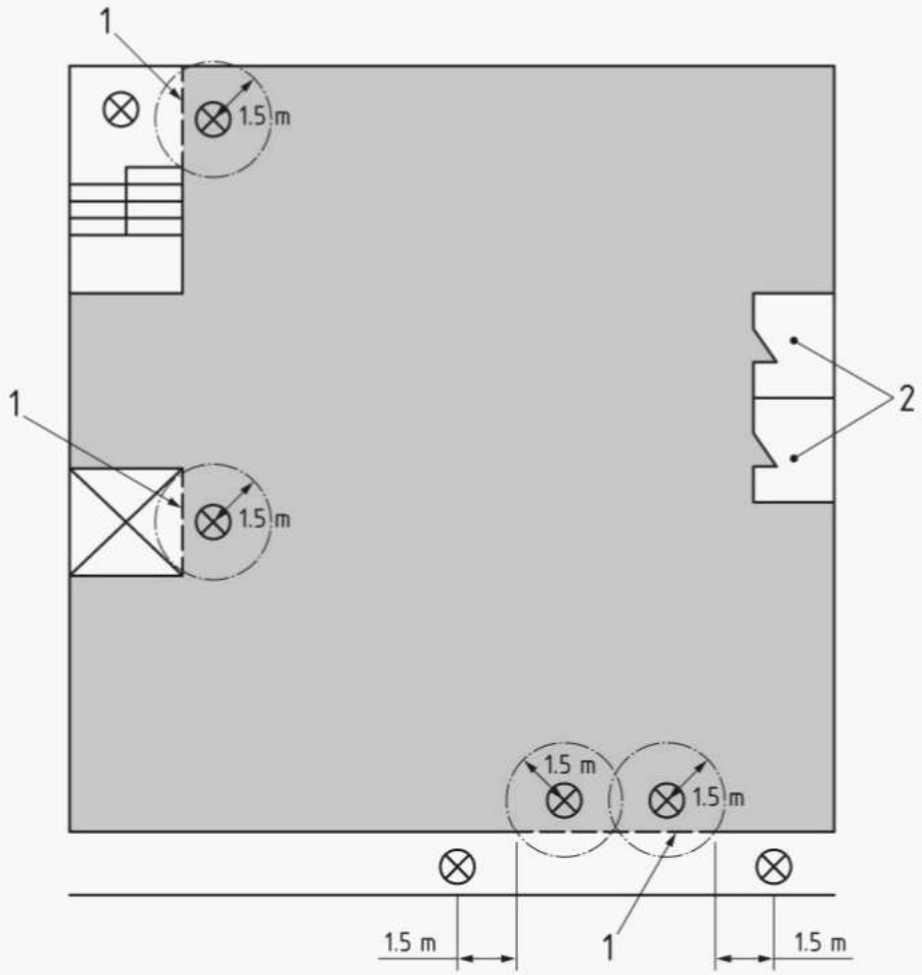
Further detectors should be provided to address the potential issue of cooling of smoke, and consequent migration of smoke through a space at a lower level than the automatic smoke detectors immediately adjacent to the shutter or active fire curtain barrier assembly. These additional detectors should be sited in accordance with Figure 2 and Figure 3.

NOTE 2 If the shutter or active fire curtain barrier assembly is located immediately adjacent to a lift landing door as an alternative arrangement to a protected lobby, there is no need to locate an automatic smoke detector between the shutter or automatic smoke barrier assembly and the lift landing doors, provided that the maximum distance between the shutter or automatic smoke barrier assembly and the lift landing doors does not exceed 150 mm.

c) Where a fire-resisting shutter or active fire curtain barrier assembly is operated only by local fire detection in the vicinity of the shutter or curtain, a test facility that simulates operation of a fire detector should be provided at an appropriate location.

NOTE 3 The purpose of this test facility is to enable routine testing of the interface between the fire detection system and the shutter or curtain assembly without the need to employ the services of a specialist contractor or to test-operate any fire detector.

Figure 2 — *Protection where fire-resisting shutters and active fire curtain barrier assemblies between a large room or open plan area and a corridor, stairway or lift shaft close automatically*



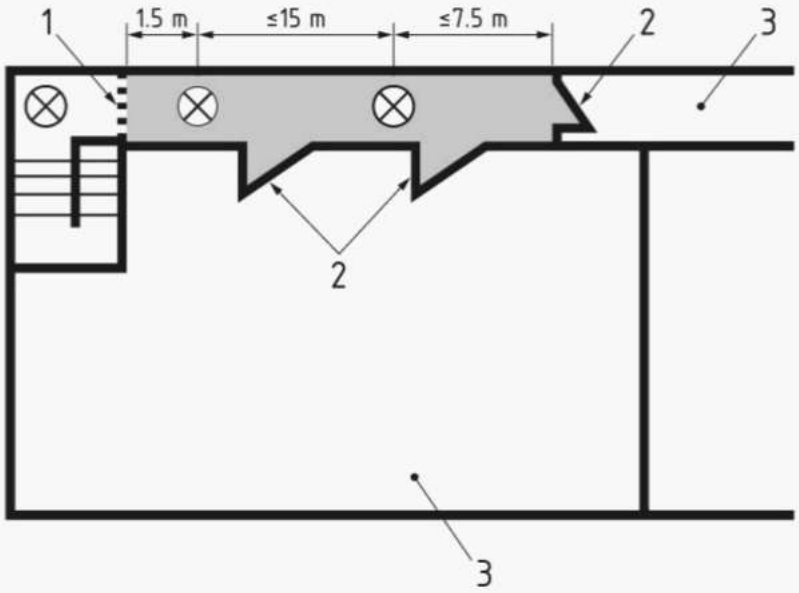
Key

1 Fire-resisting shutter or active fire curtain barrier assembly

2 Area unprotected by fire detection

Protected by automatic fire detection to a minimum Category L3 in accordance with BS 5839-1:2017; no point further than 7.5 m from the nearest smoke detector

Figure 3 — *Protection where fire-resisting shutters and active fire curtain barrier assemblies between a corridor and a stairway close automatically*



Key

1	Fire-resisting shutter or active fire curtain barrier assembly
2	Door
3	Area unprotected by fire detection
	Protected by automatic fire detection to a minimum Category L3 in accordance with BS 5839-1:2017; no point further than 7.5 m from the nearest smoke detector

12 Electricity supplies

*COMMENTARY ON CLAUSE **12***

It is sometimes appropriate to isolate an electrical supply in the event of fire (other than electrical supplies to fire protection systems). This might be because the fire is of electrical origin, or an electrically powered process needs to be stopped. However, it is extremely unlikely that the operation of a fire detection and fire alarm system would be required to shut down all the power supplies in the premises.

Power supplies to all premises of any description are normally vital to the operations in the premises. Accordingly, unnecessary isolation of electrical power can cause significant disruption in some premises.

In many cases, standby power supplies are provided to ensure continuity of supply in the event of failure of the mains supply. If an electrical power supply needs to be isolated, there is a need to ensure that this includes any standby power supplies to the equipment.

Before a fire detection and fire alarm system is used to isolate electrical supplies, the impact of the isolation, and the effect of that isolation on the business, should be established. This should be the subject of a detailed cause and effect analysis in advance of any decision being made as to what is isolated.

13 Ventilation systems (other than those used for smoke clearance or control)

*COMMENTARY ON CLAUSE **13***

Ventilation systems (other than those used for smoke clearance or control) within buildings are designed to supply fresh conditioned air and extract stale used air with the objective of enhancing comfort levels for the building occupants. There are various types of ventilation systems, which generally fall into one of the following categories.

a) *Local systems. These systems typically condition the air locally to the room/space via discrete units. Commonly, the units only condition the air within the same room as the unit. Furthermore, these systems tend only to be supplied with water and electricity to remove the heat from the stale air. Where the local ventilation system does not breach a fire-separating element, the additional risk presented by the air redistribution is relatively low, and such units might not need to be interfaced with the fire detection and fire alarm system.*

b) *Central systems. These systems condition the air centrally within designated plant rooms and then distribute the conditioned air via ductwork throughout the building within service risers and ducts. The return stale air is extracted from rooms within the building via ductwork or via return air plenums, typically above ceiling voids. As central ventilation systems redistribute air throughout the building, it is possible that during a fire these systems could move the products of combustion, i.e. fire and smoke, around the building. This increases the potential risk to the occupants by enabling the unseen spread of fire and smoke across fire-separating elements. Hence, it is necessary to control the operation of the central air conditioning plant to reduce this potential for the unseen spread of fire and smoke.*

False alarms can result in the ventilation system being shut down. In many instances, the termination of the ventilation has further interface arrangements that can also shut down on lack of ventilation, e.g. kitchen gas supplies. The ventilation system, together with any integrated systems, might require a significant amount of time and resources to restart the entire system. Therefore, where it is recommended to shut down a ventilation system on confirmed fire within the building, the fire detection and fire alarm system needs to incorporate features to minimize the occurrence of false alarms.

The recommendations provided within this part of BS 7273 relate to general ventilation systems only. Where a ventilation system has an additional function, such as chemical or biological hazard control, the shutting down of the ventilation plant can create a subsequent hazard to the health and safety of people in or around the building. Therefore, for such arrangements, a specific risk assessment needs to be undertaken by a competent person, to determine the implications of controlling the ventilation plant.

Central ventilation systems that have the capacity to extract air from the building are often used by attending fire and rescue service personnel to extract smoke following a fire event. Where this functionality of the system is provided, the specific control mechanisms need to be agreed with the AHJ.

Fire and smoke dampers are employed in ventilation systems to limit fire and smoke spread via ductwork from one part of a building and specifically from one compartment to another. A key role for dampers can be protecting escape routes through which ductwork passes. This part of BS 7273 is concerned only with electrically operated dampers that utilize signals from fire detection and alarm systems to control and release the damper, and not thermally operated mechanical dampers, which rely on a fusible link to control the release of the damper.

The interface with the fire detection and alarm system might be by means of an output directly to a damper(s), or might be via a separate damper control system, which signals to the damper(s) and controls the cause and effect logic to control the damper(s).

The following recommendations should be met.

a) Where the ventilation system would aid the migration of smoke across the compartment or fire-separating elements, the central heating, ventilation and air conditioning (HVAC) system should shut down upon a confirmed fire signal.

b) The minimum level of automatic fire detection to initiate the fire signal for the shutdown of the HVAC system should be in accordance with the fire strategy for the building.

NOTE The level of detection might be that of a Category L system, as defined in BS 5839-1:2017, or might comprise only duct detection. Guidance on duct detection is given in the FIA Code of practice for design, installation, commissioning and maintenance of duct smoke detector (DSD) systems [5].

c) Ventilation systems should incorporate the design recommendations of BS 9999.

d) Where HVAC systems incorporate fire and/or smoke dampers that are required by the fire strategy for the building to close on operation of a fire detection and fire alarm system, the principles of this part of BS 7273 should be applied to the interface with these devices.

14 Lighting, intelligent signage and wayfinding

*COMMENTARY ON CLAUSE **14***

Lighting systems are used to enable people to safely occupy and exit premises.

Mains lighting allows people to perform visual tasks, and also to locate and use exit routes. In an emergency, however, the control of mains lighting can result in the luminaires of escape routes being switched off, by either manual devices or automatic devices, such as passive infrared sensors (PIRs). In either case, it might be desirable to switch those luminaires on automatically in an emergency.

Emergency lighting of escape routes and signs is provided so that in the event of failure of the normal lighting supply, occupants can remain in premises safely or escape routes can be used to evacuate the premises, as appropriate. Emergency lighting also guards against injury being caused by people stumbling in darkness.

When the mains lighting supply is healthy, the escape route is expected to be adequately illuminated, so there is normally no need to interface its operation with the fire detection and fire alarm system. However, if the emergency lighting has been inhibited, for example to conserve battery power in premises where occupants are allowed to stay in the building during a mains supply failure, it might be appropriate to reactivate the escape route emergency lighting in the event of an emergency such as a fire.

In addition, if dynamic safety sign systems are used to direct users towards escape routes that are still safe and away from those contaminated by smoke or fire, then the information from the fire detection and fire alarm system is one of the major control inputs.

In the event of failure of the interface, it is desirable that the ASE performs in the manner that affords the greatest degree of safety. The procedures would vary dependent on specific site requirements.

In evacuation conditions, it is normally advisable that:

- *if mains lights are switched off, either manually (e.g. on fire escape routes that are not in normal use) or by automatic devices such as PIR control, the illumination is switched on to full level;*
- *in premises operating at reduced light levels for operational or aesthetic reasons (e.g. cinemas, theatres and some restaurants), these light levels are increased, automatically or manually, to full output;*
- *exit signs are always visible, in both supply healthy and supply failed conditions, in premises where occupants are unfamiliar with the premises. Maintained exit signs are particularly suitable as*

these are already illuminated, but it is not advisable to switch them to battery activation as this unnecessarily wastes battery power. If an exit route becomes unsuitable for use, a directional safety signage system (DSSS) can be used to warn occupants in accordance with the fire strategy for the premises.

The following recommendations should be met.

a) Emergency lighting, where installed, should conform to BS 5266-1, BS EN 1838 and BS EN 50172 (BS 5266-8).

b) The interface of control systems should not prejudice the fail-safe operation of either system.

NOTE This normally means that in a failure of communication of the input device, the emergency lighting reverts to normal operation and the fire detection and fire alarm system continues to function.

15 Paging systems

*COMMENTARY ON CLAUSE **15***

Data paging systems are used to send messages to both mobile, portable and fixed receiving equipment in order to provide a secondary form of alerting to incidents of fire or fault. Although not exclusively, in order to provide messages to mobile personnel, the message transfer link is normally by radio signals sent to radio paging receivers carried or worn by the recipient(s).

Such systems are also used to provide pre-alert and staff alarm messages to fire wardens, supervisors and facilities technical staff to allow for validation of the fire signal prior to evacuation.

Radio data paging systems are also specifically used to alert Deaf and hard of hearing people in the event of a fire by means of a tactile alarm received by a pocket radio pager carried or worn by the recipient.

The interface to the data paging system is primarily by means of a relay output or outputs from the fire detection and fire alarm system to indicate fire or fault. Data output from addressable fire detection and fire alarm systems can also be used by the data paging system to interpret the priority signal events of fire and fault. Other information, including general data paging messages, can be sent as required.

All radio paging used with fire detection and fire alarm systems is subject to licensing restrictions in the UK. Advice can be sought from Ofcom, the regulatory authority, as to the specific licence required and the applicable restrictions for use.

The following recommendations should be met.

a) All radio data paging systems should conform to the applicable requirements of ETSI EN 300 224.

NOTE Attention is also drawn to the Radio Equipment Directive 2014/53/EU [6].

b) Radio data paging systems for Deaf and hard of hearing people should additionally meet the recommendations given in BS 5839-1:2017, Clause **18** and Annex C.

c) Power supplies should conform to BS EN 54-4.

d) Prior to any installation of radio-based systems, a radio survey should be undertaken to test for adequate signal propagation across all areas of the intended site. The survey should also establish a suitable channel free from interference for reliable operation of the radio link. In all aspects, the manufacturer's recommendations should be met, and a written report should be provided to the system specifier and end user for inclusion in the system log.

e) In all cases, the fire and fault messages from the CIE should take priority over general messages.

16 Cables, wiring and other interconnections

*COMMENTARY ON CLAUSE **16***

This clause provides recommendations for the work associated with installation between the fire alarm equipment and ASE. The critical signal path normally comprises one or more cables. However, other forms of interconnection, such as radio communication, may be used. The critical signal path normally fails safe. Therefore, an open circuit or a short circuit on any wiring of the critical signal path causes a change of state of the ASE. Whilst this is often the case, care needs to be taken when interfacing to other systems, e.g. a smoke control system where opening all the control vents on a signal path fault would not be desirable.

*The installation of these systems is often carried out by different specialist contractors, and various contractual arrangements are possible. It is therefore important that the exchange of information and definition of responsibilities (Clause **6**) are fully understood.*

The nature and quality of the installation work need to be such as to maintain the integrity of the fire detection and fire alarm system and minimize the duration and extent of disablement of the system during maintenance or modifications. Installation practices and workmanship need to conform to BS 7671. Cables need to be sufficiently robust to resist mechanical damage, or to have additional mechanical protection against damage.

Penetration of construction (e.g. for the passage of cables, conduit, trunking or tray) needs to be made good to avoid the free passage of fire or smoke, regardless of whether the construction has a recognized degree of fire resistance.

Even though identification of design shortcomings is not generally the responsibility of an installer, good practice would dictate that, if the installer is aware of any such shortcomings, particularly those arising from features of the building that might not have been known to the designer, they need to be drawn to the attention of the designer, user or purchaser.

*Nevertheless, the designer needs to provide sufficient information and guidance to the installer to enable the installer to satisfy the relevant recommendations of Clause **6** in the absence of expertise in the design of fire detection and fire alarm systems. In this respect, the installer is then, in effect, simply complying with specified requirements of the designer.*

The following recommendations should be met.

a) The responsibilities associated with the interface arrangements between fire detection and fire alarm systems conforming to BS 5839-1:2017 and other equipment that forms part of the fire strategy should be clearly defined, agreed and documented prior to the commencement of the installation work.

b) The entire system should conform to the requirements of BS 7671.

c) Joints in cables, other than those contained within the enclosures of equipment, should be avoided wherever practicable.

d) Where cables, conduits, trunking or tray pass through floors, walls, partitions or ceilings, the surrounding hole should be as small as reasonably practicable and made good with fire-stopping materials that maintain the fire resistance of the associated supporting construction. Spaces through which fire or smoke could spread should not be left around the cable, conduit, trunking or tray.

e) Mineral insulated copper sheathed cables conforming to BS EN 60702-1 and steel wire armoured cables conforming to BS 6724 or BS 7846 may be used throughout all parts of the critical signal path without additional mechanical protection. Other cables used for the critical signal path

should be given additional mechanical protection. This protection may be provided by laying cable on tray, protecting it by burying in the structure of the building, or by installation in conduit, ducting or trunking. Where particularly arduous conditions might be experienced (such as impact by forklift trucks or goods trolleys), mechanical protection should be provided by burying the cable in the structure of the building or installation in metal conduit or trunking.

f) Where an open- or short-circuit fault on a cable results in the same effect on ASE as a fire alarm signal, there are no recommendations for the fire resistance of the cables used for the interface. Where this is not the case, the cables should be fire-resistant in accordance with BS 5839-1:2017, **26.2**.

NOTE This recommendation does not apply to a "flying lead" not greater than 1 m fixed to an item of ASE at the time of manufacture.

g) On completion of the works, the installer should issue an installation certificate (see BS 5839-1:2017).

17 Electromagnetic compatibility (EMC)

*COMMENTARY ON CLAUSE **17***

Any electrical installation can be susceptible to, or cause, electromagnetic interference if not designed and installed properly. Mobile devices, two-way radios and other electrical circuits in close proximity can all affect any part of a hardwired or radio-actuated system. The effect in extreme cases could be that ASE is actuated, or even that ASE fails to actuate in the event of fire. However, simple attention to good installation practices is likely to preclude such effects in most hardwired systems.

In the case of radio-actuated systems, interference from other sources can be reduced by appropriate receiver design (e.g. narrow receiver bandwidth) and suitable encoding of transmissions. It is particularly important in the case of systems that actuate ASE by discontinuation of radio transmission that receivers can discriminate between signals from the associated transmitter and other interfering signals, which might otherwise prevent ASE from being actuated when the signal from the transmitter is discontinued.

With indirect actuation, it is common, particularly in large buildings with many ancillary devices, for data transmission to be used to communicate between central control equipment and outstations that then control the ASE. It is important, in these cases, to ensure that any data transmission on which actuation of ASE depends is sufficiently immune to interference that could prevent, or cause, actuation of ASE.

Fire detection and fire alarm systems can also be susceptible to electromagnetic interference. Compliance with BS 5839-1:2017, and use of CIE conforming to BS EN 54-2, minimizes the possibility of system malfunction as a result of such interference. Attention is drawn to the potential of interconnection of ASE, and associated equipment, with the fire detection and fire alarm system to be detrimental to the immunity of the latter system to electromagnetic interference.

Electromagnetic interference can be reduced by separation, galvanic isolation, screening or filtering. Where ASE is interfaced to a fire detection and fire alarm system, the resultant system might be unique to a specific site. The individual components can be tested to appropriate EMC product family standards, but the adoption of good engineering practice to their interfacing is likely to minimize any problems caused by electrical interference.

The following recommendations should be met.

a) There should be adherence to any recommendations of the manufacturer of the ASE in respect of electromagnetic compatibility.

NOTE 1 Attention is drawn to the Electromagnetic Compatibility Regulations 2016 [7], which implement the EMC Directive 2014/30/EU [8].

b) In radio-actuated systems, radio transmitters and receivers should meet the spectrum utilization requirements specified in ETSI EN 300 220-1 and ETSI EN 300 220-2. Radio receivers should meet the performance requirements for, as a minimum, a Category 2 classification. For critical path radio links, the minimum classification should be Category 1.5. The format and coding of transmissions should be such as to minimize potential for spurious actuation, or for prevention of actuation, of ASE as a result of interference by other radio transmissions.

NOTE 2 There might be other national radio interfaces available.

NOTE 3 Attention is drawn to the Radio Equipment Directive 2014/53/EU [6].

c) In any system using data transmission within the critical signal path, or between the critical signal path and any ASE, design and installation practices should be such as to minimize potential for corruption of data as a result of electromagnetic interference, particularly where this could result in failure of ASE to be actuated in the event of a fire signal.

d) Cables carrying power or signals to ASE should not be introduced into the CIE of the fire detection and fire alarm system, unless the manufacturer of the latter equipment confirms that this will not detrimentally affect the performance of the fire detection and fire alarm system as a result of electromagnetic interference.

e) Interface equipment between the critical signal path, or the CIE, and the ASE should incorporate galvanic isolation or appropriate filtering to minimize any risk of malfunction due to electrical interference. Appropriate separation should be maintained, and structured cabling systems should be used to minimize risk of electrical interference.

18 Electrical safety

*COMMENTARY ON CLAUSE **18***

Electrical circuits associated with the actuation of ASE are a form of electrical installation, regardless of whether the circuits operate at extra-low voltage (ELV) or low voltage (LV).

Mains supplied equipment normally has a circuit protective conductor (CPC) to provide a protective earth. Some electrical equipment, such as double-insulated equipment, does not have a protective earth because of inherent safety built into the design of the equipment, but, in general, LV and ELV circuits within the scope of this part of BS 7273 need a CPC.

Where live parts of the fire detection and fire alarm system can be touched without the use of a tool, e.g. when removing a detector from its base, it is necessary for the fire detection and fire alarm system to meet the requirements of separated extra-low voltage (SELV). When introducing connections to ASE into a fire detection and fire alarm system, care is needed to ensure that the SELV rating is not compromised.

Introduction of power supplies from other systems into fire alarm CIE can also present a hazard during maintenance, particularly in the case of LV supplies and ELV supplies that do not meet the requirements of SELV. It is preferable that circuits of other equipment terminate externally to the enclosure of the fire alarm CIE (e.g. in a junction box immediately adjacent to the enclosure) where safe isolation facilities can be provided. If circuits other than those of the fire detection and fire alarm system enter the fire alarm CIE, they need to be clearly identified within the CIE and protected against exposure to touch when the door of the CIE is opened.

It is necessary for interface equipment interconnecting the fire detection and fire alarm systems to ASE to be rated to the maximum voltage of the ASE, taking into account any potential transient

conditions that might be reasonably expected, such as lightning strikes, power supply interruptions and equipment failure.

The following recommendations should be met.

a) All electrical installation work should be carried out in accordance with BS 7671.

b) LV circuits and ELV circuits should be appropriately labelled and should be segregated in accordance with BS 5839-1:2017, **29.2**.

c) Means should be provided for safe isolation of all LV circuits within the scope of this part of BS 7273. The isolation facilities should be suitably sited, in the vicinity of the equipment served, for use by maintenance technicians without the need for access to remote parts of the building. It should be possible to lock the facilities in both the normal and isolated positions to prevent unauthorized use. There should be a clear means of indication, at the isolation facility, as to the state of the circuit (isolated or live). The method of indication should not comprise a fallible component, such as an illuminated indicator.

d) Where practicable, circuits serving ASE should not enter fire alarm CIE. Where this cannot be avoided, wiring of these circuits within the CIE should be easily identifiable and live parts should be protected from exposure to touch when the door of the enclosure is opened (e.g. by use of an insulated cover).

e) ELV circuits that do not meet the requirements of SELV should be treated as functional extra-low voltage (FELV) in accordance with BS 7671.

f) Auxiliary terminals and associated equipment used in the interfacing of ASE to a fire detection and fire alarm system should be rated in accordance with the most onerous voltages and current with which they are interconnecting.

19 Commissioning

*COMMENTARY ON CLAUSE **19***

The process of commissioning involves thorough testing of the interface with the ASE to ensure that, in the event of a fire signal, the ASE responds correctly in accordance with this clause and any design or purchase specification. The organization responsible for commissioning the interface might, or might not, be the same organization that installed or maintains the fire detection and fire alarm system. A further organization is likely to be responsible for the ASE itself.

In many cases, such as the interface between a non-addressable fire detection and fire alarm system and a lift controller, the commissioning process is very simple; in other cases, such as the interface with a complex smoke control system, extensive work might be involved. However, in all cases, great care needs to be taken, as commissioning is the final opportunity to identify potential for incorrect functioning of interfaces before bringing them into operation. Although the technology, and hence any wiring arrangement, etc., might not be complicated or require special skills in its installation, simple errors might place persons at serious risk in the event of fire.

The risk to which people might be exposed in the event of incorrect operation of an interface is not hypothetical. Incorrect programming of the interface with smoke extraction systems in blocks of flats has occurred, resulting in the vents in a smoke shaft opening on every floor of the block, rather than only the floor in which smoke from a fire on that floor existed. This then provided a path for smoke spread throughout all floors of the building.

It is not, in general, the responsibility of the commissioning organization (which is often the same organization as the installer of the fire detection and fire alarm system) to confirm that the cause and effect of an interface in any particular situation is appropriate under fire safety legislation. In general,

the responsibility of the commissioning organization is to verify that the interface operates correctly in the manner designed, that the cause and effect is programmed in accordance with the specification of the designer, that installation workmanship is generally of adequate quality and that there is compliance with this part of BS 7273. Commissioning is often the first opportunity to confirm this (e.g. by confirming that, when a fire alarm signal occurs within a specific zone, the programming of the interface is such that the ASE responds appropriately).

The recommendations in this clause are applicable both to new systems, and to modifications and additions to existing systems.

The following recommendations should be met.

a) The interface with ASE should be commissioned by a competent person, who has access to the designed cause and effect and any requirements of the purchaser (e.g. a purchase specification), along with other relevant documentation or drawings, including the recommendations of the manufacturer of any relevant equipment in respect of installation and commissioning. The level of competence should be appropriate for the complexity of the interface arrangements and the means for interconnection with both the ASE and the fire detection and fire alarm system.

b) Any person responsible for commissioning the interface with ASE (including, in simple cases, any representative of the purchaser responsible for the commissioning process) should either possess, at least, a basic knowledge and understanding of this part of BS 7273, or be provided with sufficient written guidance to enable a person of that competence to satisfy all recommendations of this clause.

c) There should be cooperation and coordination between all parties involved, and the responsibility of each party should be defined prior to arrangement of the interface with ASE.

d) At commissioning, all equipment should be inspected and should be tested for correct operation to check that it operates satisfactorily in both the non-fire and fire states, and that, in particular:

   1) all ASE responds correctly in the event of a fire signal (where appropriate after any delay permitted by this part of BS 7273) and when the evacuate control at the control equipment of the fire detection and fire alarm system is operated, including in the following circumstances:

      i) where there could be different responses to different devices, such as manual call points or detectors (whether intentionally or inadvertently as a result, for example, of incorrect programming), correct response to each type of device should be confirmed; and

      ii) where there is a complex cause and effect in respect of ASE (e.g. in a building divided into a number of alarm zones), on operation of a manual call point or fire detector in each alarm zone in turn, all relevant ASE (e.g. those in the particular alarm zone) should respond correctly, while ASE not required by the specification to respond (e.g. those in other alarm zones) should not do so;

      NOTE 1 Compliance with this recommendation might necessitate the involvement of the relevant ASE contractor.

   2) all labels and notices required by the product specification are in place and clearly legible;

3) all manual controls (whether or not required for compliance with the recommendations of this part of BS 7273), when operated, result in the correct response of the relevant ASE. To ensure that manual controls have been correctly wired, each control should be operated in turn; the correct response of the ASE should be confirmed when, firstly, the fire alarm CIE is in the normal (non-fire) state, and then when a fire signal occurs in the building (or in the alarm zone of the building);

> **WARNING**. Sudden response by ASE can cause undue risk to occupants of the building, including fear or alarm, or even injury.

4) siting of manual controls, and the nature of the controls provided, conforms to the design specification;

5) any local audible warning of impending response of ASE operates correctly;

6) where appropriate, emergency escape lighting is provided in the vicinity of manual controls;

7) the fire detection and fire alarm system conforms to the requirements of the specification, particularly in the case of localized detection required for operation of, for example, fire-resisting shutters, smoke curtains and smoke control systems;

8) arrangements for monitoring conform to Clause **5**; and

9) power supplies to interface equipment are in accordance with the design specification.

e) On completion of commissioning, a certificate signed by a competent person should be issued. This certificate may be the same as the certificate for the fire detection and fire alarm system, provided that the latter refers to the interface with the ASE and to this part of BS 7273.

NOTE 2 A model commissioning certificate is shown in Annex B.

NOTE 3 Even in simple cases, where commissioning might be undertaken by the user, completion of a commissioning certificate is appropriate, as evidence that the interface with the ASE has been properly commissioned; such evidence might be requested by an enforcing authority/body.

f) On completion of commissioning, it should be ensured that the user has sufficient information regarding the operation of the interface arrangement and the response of ASE to enable maintenance in accordance with Clause **20**.

20 Maintenance

20.1 Routine testing

The following recommendations should be met.

a) Even if the critical signal path normally fails safe, so that most faults would result in the same response of the ASE as occurs from a fire signal, regular testing should be carried out as detailed in **20.1**b) to ensure that there has not been any failure of a component, such as a relay (e.g. the common fire relay at the fire alarm CIE), that could prevent response of ASE.

NOTE 1 Routine testing also confirms that the ASE is operating correctly and that, for example, fire shutters or fire curtains are not blocked.

b) The frequency of routine testing should be as follows:

1) for the interface with ASE to which Clause **11** applies, and with smoke control systems supporting means of escape in premises other than blocks of flats: weekly;

2) for all other interfaces with ASE: monthly.

Testing of the interface should be carried out by operation of the fire alarm system, using a manual call point, an automatic fire detector or a suitable test facility that simulates operation of an automatic fire detector.

It should be confirmed that all ASE changes state in response to the fire signal.

NOTE 2 The purpose of the weekly test is not to confirm the correct cause and effect, or programming, of the interface arrangement. It is only necessary to carry out one test that ensures that the interface(s) with all ASE operates such that at least one change of state of each ASE occurs.

NOTE 3 Since BS 5839-1 recommends that the fire detection and fire alarm system is tested every week, that test can be used to meet this recommendation. However, since the test recommended in BS 5839-1 is carried out during normal working hours, response by the ASE might result in major inconvenience or risk to occupants. There are several safe and convenient methods that can be developed to carry out this test. For example, prior warning of imminent release of a fire shutter could be given to occupants by means of a public address system, a voice alarm system or a local audible warning at each shutter. Alternatively, the interface between the fire detection and fire alarm system and the ASE might be disabled at the time of the weekly fire alarm test; a further test could then be carried out at a time of low occupancy of the building to test the response of ASE to a fire signal.

NOTE 4 To avoid complacency on the part of occupants when they hear audible fire signals, it is undesirable that any individual occupant hears the evacuation signal on more than one occasion per week, and the duration for which fire alarm sounders operate during any test specifically carried out to test the response of ASE needs to be kept to the minimum practicable.

NOTE 5 Use of manual controls that operate ASE (i.e. not via a fire detection and fire alarm system) will not necessarily meet this recommendation, as this will not necessarily test the entire critical signal path, unless a further test is carried out (e.g. to operate the common fire relay).

c) Where response of ASE in the building is not initiated when a weekly test of a fire detection and fire alarm system is carried out, a suitable test regime should be developed to ensure that, at least, each interface with all ASE is tested at the appropriate frequency. If, for example, in a building with multiple alarm zones, a number of different relays are provided to each cause response of ASE in only one, or a proportion of, alarm zones, the test regime should ensure that a different relay is operated each week, so that all relays are tested in rotation over an undefined period of time.

20.2 Inspection and servicing

*COMMENTARY ON **20.2***

The critical signal path, any equipment on which ASE depends for its response and the ASE itself are periodically inspected and serviced so that unrevealed faults are identified, preventive measures can be taken to ensure the continued reliability of response, problems of unnecessary response are identified and suitably addressed, and the user is made aware of any changes to the building that affect the operation of ASE.

a) Inspection and servicing should be carried out by a competent person, with specialist knowledge of the relevant equipment, sufficient information regarding the equipment, and adequate access to spares, at intervals not exceeding 6 months.

NOTE 1 This may be carried out as part of the periodic inspection and servicing of the fire detection and fire alarm system.

NOTE 2 This is normally carried out by an outside organization, such as a fire alarm servicing organization; care is necessary to ensure that, if, for example, in-house employees are used for this task, they have equivalent competence to the technicians of a typical fire alarm servicing organization. Competence of a fire alarm servicing organization can be assured by the use of organizations that are third-party certificated, by a UKAS-accredited certification body, to carry out inspection and servicing of fire detection and fire alarm systems.

b) The log book for the fire detection and fire alarm system should be examined. Any faults in respect of ASE should receive appropriate attention.

c) A visual inspection should be made to check whether structural or occupancy changes have affected compliance with the recommendations of this part of BS 7273. Particular care should be taken to verify whether:

   1) all manual controls necessary for compliance with this part of BS 7273 remain unobstructed and conspicuous;

   2) any changes to the layout, use or occupancy of an area make the provision or siting of automatic fire detectors non-compliant with the recommendations of this part of BS 7273.

d) Any batteries needed for compliance with this part of BS 7273 should be checked in accordance with the equipment manufacturer's instructions.

e) Any fault indicators necessary for compliance with this part of BS 7273 should be checked, where practicable, by simulation of fault conditions.

f) All further checks and tests recommended by the manufacturer of the ASE should be carried out.

g) On completion of the work, any outstanding defects should be reported to the premises management, an entry should be made in the log book of the fire detection and fire alarm system and a servicing certificate should be issued.

NOTE 3 A model servicing certificate is shown in Annex C.

20.3 Inspection and test over a 12-month period

In addition to the work recommended in **20.2**, the following work should be carried out every year.

a) The switch mechanism of every manual control necessary for compliance with this part of BS 7273 should be tested by removal of a frangible element, insertion of a test key, or operation of the device as it would be operated in the event of fire.

b) All primary (non-rechargeable) batteries that are required to provide power for the correct operation of equipment necessary for compliance with this part of BS 7273 should be replaced.

c) A visual inspection should be made to confirm that all readily accessible cable fixings are secure and undamaged.

d) All further annual checks and tests recommended by the manufacturer of the ASE should be carried out.

NOTE The work may be carried out over the course of two or more service visits during each 12-month period, and may be carried out as part of inspection and servicing of the fire detection and fire alarm system.

Annex A (informative) Applications for interfaces

COMMENTARY ON ANNEX A

There are many different reasons as to why it is desirable for ASE to change state when a fire detection and fire alarm system operates. Normally, the objective of the interface falls into one of the categories described in this annex.

A.1 Elimination of the original source of ignition

Heat-producing appliances, electricity and fuel are all potential sources of ignition. By shutting off fuel or power to heat-producing appliances or, more generally, isolating fuel and power, the original source of ignition might be eliminated, thereby preventing continuation of combustion.

For example, in the event of a fire involving overheating of food in a kitchen, continued combustion of the food might be largely prevented if the fuel or power to the cooking equipment is shut off. Similarly, if leakage of fuel (e.g. gas or oil) was the cause of a fire, shutting off the supply of the fuel might prevent continued development of the fire. Electricity is a common cause of fire, as a result of faults in electrical equipment and wiring. If such a fire is detected in the early stages, isolation of the electrical supply might prevent continuation of the fire; this arrangement is not common, but can be appropriate in the case of localized special hazards associated with ignition of fire by electrical equipment.

In these cases, operation of the interface is commonly triggered only by automatic fire detection within a specific area, rather than general operation of the fire detection and fire alarm system. The relationship between the ASE and the fire detection and fire alarm system is, under these circumstances, specified within the cause and effect logic of the fire detection and fire alarm system, which is usually defined by the fire strategy for the premises.

A.2 Prevention of a second fire

When a building is evacuated on operation of a fire detection and fire alarm system, in certain circumstances, a further fire might be caused by unattended appliances. The most obvious example of this occurs in commercial kitchens; if staff evacuate the kitchen (e.g. as a result of a fire elsewhere in the building), it is possible that cooking equipment might not be switched off prior to evacuation. The unattended cooking processes can then result in a fire within the kitchen.

In these circumstances, it might be appropriate for equipment to be shut down (e.g. a gas valve serving cooking equipment to be closed) regardless of the source of the fire alarm signal, so necessitating only a very simple cause and effect.

A.3 Prevention of fire or smoke spread

It is common for an interface to be provided for the purpose of initiating measures to prevent spread of fire. The associated ASE comprises equipment such as fire-resisting shutters, active fire curtain barrier assemblies, fire and smoke dampers and facilities for shut-down of ventilation systems (e.g. to stop recirculation of smoke).

Triggering of the interface might occur only on detection of fire within limited areas, such as the areas on each side of a fire shutter. In other cases, it might be appropriate for a simpler arrangement

whereby triggering of the interface results from operation of the fire detection and fire alarm system anywhere in the premises. The former arrangement is likely to require an addressable fire detection and fire alarm system, whereas this might not be necessary for the simpler cause and effect in which any fire signal within the premises triggers the interface. Routine testing of the latter arrangement by building management is likely to be much simpler (as it is possible during the weekly testing of the fire detection and fire alarm system); in the case of triggering of the interface by localized fire detectors, the provision of test switches is normally necessary.

A.4 Support for means of escape from fire or firefighting operations

It is common for there to be an interface between a fire detection and fire alarm system and supporting provisions for means of escape from fire. These provisions often relate to smoke control. The ASE can comprise mechanical smoke extraction systems, pressure differential systems or a simple natural smoke ventilation system. The smoke curtains can also form part of the measures to protect means of escape from ingress of smoke.

Most shopping complexes incorporate facilities for smoke extraction from the malls and, sometimes, shop units. The smoke control arrangements in these buildings can be quite complex and involve numerous smoke control zones, and there is a need for very careful commissioning to ensure that the cause and effect within the fire strategy is correctly implemented.

Another common example, which can also involve a quite complex cause and effect, is smoke extraction within the common parts of blocks of flats. In its simplest form, a natural smoke ventilation system can comprise a single automatic opening vent (conforming to BS EN 12101-2), a power supply (conforming to BS EN 12101-10), and a test/reset manual control located within sight of the automatic opening vent to prevent risk of entrapment when the vent closes.

In more complex smoke control arrangements, the vents/dampers open into a vertical smoke shaft, from which smoke is extracted to atmosphere by natural buoyancy or smoke extraction fans. In these cases, smoke detection is provided to operate the smoke control system (and to start up the smoke extraction fans if provided). The cause and effect for the vents is normally quite complicated, in that, for example, only the vent on the fire floor operates, while it is essential that vents on other floors remain closed (to maintain compartmentation). This normally requires addressable fire detection, which, in the case of blocks of flats, does not normally result in operation of any sounders, as this would undermine the stay put strategy adopted in blocks of flats. As it is undesirable for building management to test-operate smoke detectors, the provision of manual test switches is appropriate.

Pressure differential systems are used to prevent the passage of smoke from one area to another (normally from accommodation into an escape route, such as a stairway). Pressure differential systems require well-designed, engineered and robust control systems and strategies to ensure that the appropriate airflow and pressure criteria are achieved. This requires the expertise of a suitably qualified and experienced smoke ventilation specialist.

Use of means of escape is sometimes supported by intelligent signage, which can direct building occupants towards appropriate escape routes in the event of fire. The route(s) indicated can be dependent on the location of a fire, necessitating an addressable fire detection and fire alarm system. In some cases (e.g. where there is a multiplicity of escape routes or complex evacuation arrangements), considerable care is needed in verification of the cause and effect as part of the commissioning process.

A.5 Grounding of lifts

In the event of fire, it is common for an arrangement whereby lifts, other than firefighters lifts and evacuation lifts, automatically return to ground floor (or sometimes another appropriate floor if fire is detected on the ground floor or if the normal means of access and egress is located on another floor). This is not always necessary, dependent on the fire strategy for the building, but is recommended in BS 9999.

This is usually quite simple to arrange with modern lift control equipment and simply requires a single interface between the fire detection and fire alarm system and the lift controller, as the arrangement is normally such that, when the fire detection and fire alarm system operates anywhere in the building, the lifts in question return to an exit level and then remain out of service until the fire detection and fire alarm resets.

A.6 Operation of paging systems

Other than for warning people who are Deaf and hard of hearing, paging systems are not used as a primary means of warning building occupants in the event of fire. Recommendations for paging systems designed to provide warning to Deaf and hard of hearing people in the event of fire are given in BS 5839-1:2017, Clause **18**.

Paging systems are sometimes used to alert key personnel on operation of a fire detection and fire alarm system. For example, when a fire detection and fire alarm system incorporates a staff alarm arrangement, whereby there is an investigation of a fire alarm signal from a smoke detector before fire alarm sounders operate, those tasked with investigating alarm signals might be alerted by pager.

Another application for use of paging equipment in the event of fire can be found on some multi-building sites, in which there are independent fire detection and fire alarm systems within each building. In the event of a fire in one building, paging systems can be used to alert key personnel in other buildings, if they have particular responsibilities to respond in the event of a fire anywhere on the site. Such key personnel can include fire teams, maintenance staff and security staff.

Annex B (informative)
Model commissioning certificate

A model commissioning certificate is shown in Figure B.1.

Figure B.1 — *Model commissioning certificate*

Certificate for commissioning of the following ancillary systems and equipment (ASE) interfaced to the fire detection and fire alarm system at:

Address .....

.....Postcode.....

Tick box:

☐ smoke control systems;

☐ lifts and other lifting appliances;

☐ gas valves;

☐ fire-resisting shutters and active fire curtain barrier assemblies;

☐ electricity supplies;

☐ ventilation systems;

☐ lighting, intelligent signage and wayfinding;

☐ paging systems.

I/we being the person(s) responsible (as indicated by my/our signatures below) for the commissioning of the above ASE, CERTIFY that the equipment/system has been commissioned and interfaced to the fire detection and fire alarm system above in accordance with the design requirements, except for the variations, if any, stated in this certificate.

Variations from the recommendations of BS 7273-6:2019 [see BS 7273-6:2019, Clause **7**c)]:

.....
.....
.....

- All equipment operates correctly.
- The cause and effect of the fire detection and fire alarm system, implemented via the interface, operates in accordance with the fire strategy.
- Installation work is, as far as can be ascertained, of an acceptable standard.
- I/We have carried out commissioning in accordance of the recommendations of BS 7273-6:2019, Clause **19**.
- Suitable documentation has been provided to the user.

The following work should be completed before/after (delete as applicable) the system becomes operational:

.....
.....
.....

Name (in block letters) ..... Position.....
Signature ..... Date.....
For and on behalf of .....
Address .....

.....Postcode.....

The extent of liability of the signatory is limited to the ASE interfaced to the fire detection and fire alarm system.

Maintenance
It is strongly recommended that after completion the ASE is maintained in accordance with the manufacturer's recommendations.

User's responsibilities
The user should appoint a responsible person to supervise routine testing of the ASE in accordance with BS 7273-6:2019, **20.2**, and to supervise all matters pertaining to the associated fire detection and fire alarm system.

Annex C (informative)
Model servicing certificate

A model servicing certificate is shown in Figure C.1.

Figure C.1 — *Model servicing certificate*

Certificate of servicing for the interface equipment linked to the fire detection and fire alarm system at:

Address:

.....

.....

I/we being the competent person(s) responsible (as indicated by my/our signatures below) for the servicing of the fire detection and fire alarm system, particulars of which are set out below, CERTIFY that the said work for which I/we have been responsible complies to the best of my/our knowledge and belief with the recommendations of BS 5839-1:2017, Clause **45**, and BS 7273-6:2019, Clause **20**, except for the variations, if any, stated in this certificate.

Name (in block letters): ..... Position: .....
Signature: ..... Date: .....
For and on behalf of: .....
Address: .....
.....
..... Postcode: .....

The extent of liability of the signatory is limited to the system described below.

Extent of system covered by this certificate:

- smoke control systems;
- lifts and other lifting appliances;
- gas valves;
- fire-resisting shutters and active fire curtain barrier assemblies;
- electricity supplies;
- ventilation systems;
- lighting, intelligent signage and wayfinding;
- paging systems.

.....
.....
.....
.....

Variations from the recommendations of BS 5839-1:2017, Clause **45**, and BS 7273-6:2019, Clause **20**, for periodic or annual inspection and test (as applicable):

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.....
.....
.....

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